REISSUE LITIGATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re	:	**Jacques Quellais and Francois Girard**
		Group Art Unit: 3728
Application No.	:	09/994,059
Reissue of	:	U.S. Patent 6,079,125
Filed	:	November 27, 2001
Title	:	**MULTILAYER SOLE FOR SPORT SHOES**
Examiner	:	Marie Patterson

CERTIFICATE OF SERVICE BY MAIL

I CERTIFY that on May 24, 2002, I caused to be served, via U.S. first class mail, copies of the **PROTEST UNDER 37 C.F.R. 1.29(a) WITH ATTACHED EXHIBITS**, on the following counsel of record:

Mr. Gregory J. Maier
Mr. Robert T. Pous
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.
Crystal Square V, 4th Floor
1755 Jefferson Davis Highway
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Dated this **24** day of **May, 2002**.

Respectfully submitted,

By: _____
Ann W. Speckman
Registration No. 31,881

Date: May 24, 2002

SPECKMAN LAW GROUP

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Jacques Quellais et al

Serial No: 07/995,083 Group: 2404

Filed: December 22, 1992 Examiner: Cicconi

Entitled: MULTILAYER SOLE FOR SPORT SHOES

12/C NE
RO
9/9/94

Expedited Procedure

AMENDMENT AFTER FINAL REJECTION

Honorable Commissioner of
Patents and Trademarks
Washington, D. C. 20231

ATTN: BOX AF

Sir:

In response to the Office Action dated June 6, 1994, please amend the subject application as follows:

In the Claims

Please amend claim 27 to read:

--27 (amended). Sole for sport shoe made from a laminated profile comprising several layers performing distinct functions, respectively, said sole being surmounted by an upper, wherein said sole comprises at least three layers external to said upper, namely:

(a) a ground contact layer with determinate properties of flexibility, gripping and abrasion-resistance which provide good foot extension, good ground traction and a high level of wear resistance;

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(b) an upper comfort layer located directly beneath the foot, said upper comfort layer having elastic shock-absorption properties and being assembled on said upper of said [boot] shoe; and

(c) an intermediate layer of said sole, arranged directly between an upper part of said ground contact layer, by one of its faces, and the lower part of said comfort layer by its other face, having controlled torsional and flectional rigidity, and providing both for the distribution of shockwaves and stresses sensed by said ground contact layer and for their diffusion over said comfort layer before coming in contact with the foot, said intermediate layer extending over an entire surface of said ground contact layer and constituting a framework [means] for the ground contact layer preventing deformation of the ground contact layer and thereby permitting it to be made of softer, more adherent rubber.

In claim 35, line 1, change "sole" to --layer--.

In claim 37, line 2, change "the" to --an--.

Remarks

Claims 5 to 18 and 27 to 40 are pending in this application, claims 5 to 18 being withdrawn from consideration.

In paragraph 1 of the action, the Examiner has reiterated his contention that the manufacture of the comfort layer is inadequately disclosed, and has rejected applicants' contention that the materials used are well known to those skilled in the art.

The Examiner's argument ("the mere mention of utilizing an unspecified material for the comfort layer would appear to be insufficient to allow one of ordinary skill in the art to make and use the same without undue experimentation and unreasonable delay") in paragraph 1 is inconsistent with

the argument in paragraph 8:

> "It would have been obvious to one of ordinary skill in the art to provide the midsole layer of Barry et al. with zones of varying material properties, as taught by Banich et al." and "it would have been obvious to one of ordinary skill in the art to provide the sole parts of Barry et al., as modified by Banich et al., in an (sic) of a number of known durometer hardnesses".
> Thus, in paragraph 8, the Examiner inherently agrees with applicants'

contention that the selection of materials to be used to achieve the required properties of the sole layers is well within the skill of those in the art.

The claims have been amended in response to the Examiner's rejections under 35 USC 112. However, it is not clear why the Examiner considers "i.e., a first zone" in claim 29 to be indefinite; clarification would be appreciated.

As regards the indefiniteness rejection of claim 37, applicants are experiencing difficulty in devising wording which does not mention the sole, but will be glad to consider any wording acceptable to the Examiner.

Finally, with respect to lines 1 to 4 of claim 27, applicants' invention is directed to the sole of a shoe; the upper is mentioned only to indicate the position of this sole.

The Examiner has rejected claims 27, 28, 30, 34 and 36 to 40 under 35 USC 102(e) as being fully met by Barry et al. For the sake of completeness, applicants note that the Examiner failed to specify which of the two Barry et al. citations is being applied to the claims; inspection indicated that it was the '130 patent.

In Barry, the intermediate layer (20) cannot constitute a framework for the ground contact layer (16) to prevent deformation of the latter. Such a framework is particularly important at the periphery of the outsole, which determines the "grip" of the shoe; Figure 4 of the reference clearly shows that the intermediate layer does not extend to the peripheral region.

Claim 27 has been amended to recite that the intermediate layer extends over the entire surface of the ground contact layer. This feature was

IN THE UNITED S ATES PATENT AND TRADEI RK OFFICE

Applicant:	Jacques Quellais et al		
Serial No:	07/995,083	Group:	2404
Filed:	December 22, 1992	Examiner:	Cicconi
Entitled:	MULTILAYER SOLE FOR SPORT SHOES		

AMENDMENT

Honorable Commissioner of
Patents and Trademarks
Washington, D. C. 20231

Sir:

In response to the Office Action dated October 5, 1993, an extension of time for which is herewith filed, please amend the subject application as follows:

In the Specification

On page 1:

on line 4, change "using" to --with--;

on line 9, delete "designed most notably" and insert therefor --particularly intended--;

on line 22, delete "in order to be able to walk" in favor of --to permit walking--.

On page 2:

on line 4, delete "whether" in favor of --even if only--; delete "or" in favor of --,--;

on line 5, delete "not,";

on line 23, delete ", extending from bottom to top,".

On page 3:

on lir 1, after "boot" insert --,--; delete " between "currently" and "marketed";

on line 2, delete "by virtue of the fact" in favor of --in--;

on line 7, delete "to the sole a very high" in favor of --excessive--; after "rigidity" insert --to the sole--;

on line 10, after "In" insert --French--; change "Applicant has" to --applicants have--;

on line 17, delete "existing as" in favor of --in the form of--;

on line 22, delete "configured so as" in favor of --designed--.

On page 4:

on line 6, change "stiffness" to --stiffener--;

on line 9, delete "-" between "ground" and "traction", and "abrasion" and "resistance";

on line 11, change "flexible" to --supple--;

on line 19, change "least" to --minimal--;

on line 22, delete "surmount" in favor of --overcome--.

On page 5:

on line 14, delete ":" in favor of --, by--;

on line 15, change "disturb" to --disturbing--;

on lines 16 and 18, change "cut" to --cutting--;

on line 19, change "restore" to --restoring--;

on line 20, delete "-flow" in favor of --circulation--;

on line 22, change "short" to --sport--;

on line 24, delete "comprising, or not comprising," in favor of --optionally comprising--.

On page 6:

on line 2, delete "which exhibits" in favor of --with--;

on line 6, delete "placed" in favor of --located--;

on line 12, delete "surfaces" in favor of --faces ,

on line 13, delete "surface" in favor of --face--;

on line 14, delete "properties";

on line 19, delete "several" in favor of --more--; change "gives" to --provides--;

on line 21, delete ", which" in favor of --; this--.

On page 7:

on line 1, delete "efficiency" in favor of --effectiveness--;

on line 2, delete "of the fact that";

on line 6, delete "as does" in favor of --in the manner of--;

on line 18, delete "show in a" in favor of --are--; change "view" to --views--;

on line 21, delete "in the drawing";

on line 23, after "respectively," insert --two embodiments of--;

on line 24, delete "obtained according to different" and insert therefor --;--;

delete line 25.

On page 8:

on line 1, delete "show, in" in favor of --are--; delete "in";

on line 2, change "view" to --views--; before "an" insert --of--;

on line 3, delete "on the" in favor of --);--;

delete line 4;

on line 6, after "respectively," insert --two embodiments of--;

on line 8, delete entire line in favor of --molding (the comfort--;

on line 11, delete "according to" in favor of --with--;

on line 12, delete "diagrammatic" in favor of --schematic--; after "bottom" insert --plan--; after "of" insert --a special embodiment of--;

delete line 13 in favor of --layer;--;

on line 14, after "bottom" insert --plan--; after "of" insert --another

embodiment of--; after "layer" insert --;--;

delete line 15;

on line 16, change "illustrated" to --illustrate--.

On page 9:

on line 2, change "as" to --in--;

on line 3, delete "referenced in its entirety";

on line 6, change "closing" to --closure--;

on line 7, delete "-piece";

on line 8, change "incorporates" to --has--; delete "such" and "that";

on line 10, delete "respectively";

on line 14, delete "which exhibits" in favor of --with--;

on line 18, delete ",";

on line 19, delete "exhibits" in favor of --has--;

on line 25, change "surfaces" to --faces--;

on line 26, change "surface" to --face--.

On page 10:

on line 1, delete "properties" and "this";

on line 2, delete "stiffness providing simultaneously for the" in favor of --assuring both--;

on line 4, delete "coming in";

on line 6, delete "having" in favor of --of--;

on line 9, delete "According to a special" in favor of --In the--;

on line 11, after "zones," insert --namely,--;

on line 15, delete "special";

on line 22, delete "whose" in favor of --having different--; delete "are different";

on line 23, delete "and";

on line 26, delete "formed from one" in favor of --constituted by

a--.

On page 11:

on line 4, delete "Or again, for" in favor of --For--;

on line 5, delete "formed" in favor of --constituted--;

on line 6, delete "from" in favor of --by--;

on line 10, delete the entire line in favor of --The rib layer 9 may also be made of a--;

on line 13, delete "simultaneously, in particular" in favor of --both--;

on line 16, delete "According to a special" in favor of --In the--; delete ",";

on line 17, before "in" insert --(--; change "not shown" to --omitted)--;

on line 18, delete "," (first and second occurrences);

on line 20, delete "said" in favor of --the--.

On page 12:

on line 2, delete "According to another" in favor of --In the--;

on line 3, delete "," (second and third occurrence); delete "in proximity to" in favor of --near--;

on line 4, delete "arc-shaped" in favor of --arcuate--;

on line 6, after "allowing" insert --the--; delete "formed" in favor of --projecting--;

on line 7, delete ","; delete "on the" in favor of --having--; delete "of" (first occurrence) in favor of --to--;

on line 9, delete ", moreover, of the";

on line 10, delete "fact";

on line 18, change "figure" to --Figure--; delete "shows";

on line 19, before "comfort" insert --rear portion of the--; delete ", in its rear portion,"; delete "-";

on line 20, delete "piece" in favor of --portion--; delete "produced

as one piece" in favor of --unitary--; delete "this";

on line 21, delete "outer" in favor of --external--; delete "-piece--;

on line 24, after "variant" insert --,--; change "Figure" to --Figures--;

on line 25, after "layer" insert --is--.

On page 13:

on line 1, delete ",";

on line 2, delete "," (first occurrence); delete "pass through" in favor of --traverse--; delete "a value" in favor of --an amount--;

on line 15, delete "a special embodiment of";

on line 16, change "formed" to --constituted--.

On page 14:

on line 2, change "height" to --depth--;

on line 3, delete "These skids" in favor of --Skids--;

on line 6, delete "According to an example of" in favor of --In--;

on line 10, after "binding" insert --optionally--; delete "or not comprising";

on line 11, delete "strengthening" in favor of --reinforcement--;

on line 12, delete "this";

on line 13, after "in" insert --French--;

on line 16, delete "," (second and third occurrences);

on line 19, delete "this rigid"; delete "(example not" in favor of --.--;

on line 20, delete entire line;

on line 21, delete the entire line in favor of --In an application of the invention to golf shoes--;

on line 22, after "the" insert --lower part of--; after "layer" delete "," in favor of --is provided with threaded holes 22--; after "rib" delete ","; delete "allows" in favor of --for the--;

on line 24, delete entire line in favor of --con aration.--; delete line 25.

On page 15:

on line 3, delete "," after "layer";

on line 11, change "possessing" to --with--;

on line 15, delete "," after "layer" and "rib";

on line 16, delete "a";

on line 17, delete "by a";

on line 21, delete "can" in favor of --may or may not--; delete "(or not extend)";

on line 22, delete "embodiment in"; after "15" insert --embodiment--;

on line 23, change "can" to --may--;

on line 24, change "using" to --by--.

In the Claims

Please cancel claims 1 to 4 and 19 to 26, and add the following claims:

--27. Sole for sport shoe made from a laminated profile comprising several layers performing distinct functions, respectively, said sole being surmounted by an upper, wherein said sole comprises at least three layers external to said upper, namely:

(a) a ground contact layer with determinate properties of flexibility, gripping and abrasion-resistance which provide good foot extension, good ground traction and a high level of wear resistance;

(b) an upper comfort layer located directly beneath the foot, said upper comfort layer having elastic shock-absorption properties and being assembled ~~directly~~ on ~~a surface of an assembly insole of~~ said upper of said boot; and

(c) an intermediate layer of said sole, arranged directly between an upper part of said ground contact layer, by one of its faces, and the lower part

of said comfort layer by its other face, having controlled torsional and flectional rigidity, and providing both for the distribution of shockwaves and stresses sensed by said ground contact layer and for their diffusion over said comfort layer before coming in contact with the foot, said intermediate layer constituting a framework means for the ground contact layer preventing deformation of the ground contact layer and thereby permitting it to be made of softer, more adherent rubber.

28. Sole according to claim 27, wherein said comfort layer is made of a flexible material whose density increases gradually from its upper to its lower portion in contact with said rigid intermediate layer.

29. Sole according to claim 27, wherein said comfort layer is composed of several distinct adjoining zones, said zones including a first zone corresponding to the heel and having a first degree of elasticity; a second zone corresponding to the arch and having a degree of elasticity less than said first zone; and a third zone having a degree of elasticity less than said second zone and promoting control of walking.

30. Sole according to claim 27, wherein said intermediate layer has a substantially constant rigidity at all points, said rigidity being selected during manufacture as a function of intended use of the shoe.

31. Sole according to claim 27, wherein said intermediate layer has a hardness greater than 45 Shore D.

32. Sole according to claim 27, wherein said ground contact layer has a hardness of less than 45 Shore D.

33. Sole according to claim 27, wherein said comfort layer has a hardness of less than 80 Shore A.

34. Sole according to claim 27, herein said ground contact layer is made of rubber having traction and abrasion-resistance properties.

35. Sole according to claim 27, wherein said ground contact sole is made of a thermoplastic material.

36. Sole according to claim 27, wherein said intermediate layer is made of a material selected from the group consisting of filled and unfilled thermoplastic material.

37. Sole according to claim 27, wherein each of said layers constituting said sole extends over the entire surface of said sole.

38. Sole according to claim 27, wherein said layers constituting said sole are connected by adhesive bonding.

39. Sole according to claim 27, wherein said layers constituting said sole are connected by duplicate molding.

40. Sole according to claim 27, wherein said layers constituting said sole are connected by ultrasound. --

In the Abstract

In line 2, before "contact" insert --ground--;

on line 8, delete "simultaneously" in favor of --both--;

on line 10, after "and" insert --for--.

Remarks

Claims 5 to 18 and claims 27 to 40 are pending in this application, claims 5 to 18 being withdrawn from consideration. The latter claims are not being cancelled at this time, as they would presumably be allowable if a generic claim is allowed.

The specification and claims have been amended throughout in order

to correct various formalities, including those noted by the Examiner under 35 USC 112. However, applicants do not comprehend why the Examiner considers that the title is not descriptive; clarification would be appreciated.

The drawing objection under 37 CFR 1.83(a) is also not clear, as there appears to be no convenient way to illustrate the increasing density of the flexible material of the comfort layer. Reconsideration of this requirement would be appreciated.

The Examiner has alleged a lack of enabling disclosure relating to the manufacture of the comfort layer. Applicants consider that those skilled in the art of making shoe and boot soles are fully cognizant of the materials to be used to achieve the required properties of all the layers of the sole of the invention, including the variable density of the flexible material used for the comfort sole, as claimed in claim 28. The Examiner is respectfully requested to reconsider this objection under 35 USC 112, first paragraph.

The Examiner has rejected claims 1, 4 and 22 to 16 (26?) under 35 USC 102(e) as being fully met by Nichols.

Nichols discloses a multilayer sole construction for an athletic shoe in which a stiffening board member 14 is provided between an outsole 12 and midsole members 22, 24. This sole is for an athletic shoe and the problem solved is specific to such a shoe. Member 14 does not affect the flexibility of the front portion 20 of the foot because member 14 is short and terminates just behind the ball of the foot. Member 14 does not substantially extend along the complete length of the outsole 12, an is not very rigid because is is made of board.

By contrast, the intermediate layer 9 of the present invention is as long as the outer layer 7, and provides the necessary rigidity over the entire sole length.

One important aspect of the present invention is the combination of a stiffening layer with a soft or comfort layer 8. The stiffening layer 9 made of a composite material is as near as possible to the contact layer 7, and the comfort layer 8 stays in contact with the foot. Such a structure makes it

possible to combine g. d contact and rigidity with fo. comfort. The complete energy absorbing or comfort layer 8 lies between the foot and the stiffening layer 9.

The Examiner has further rejected claims 1, 4, 22, 25 and 26 under 35 USC 102(b) as being fully met by Lin.

Lin shows a midsole insert 10 placed above an upper surface 18 of an outsole 14, for an activewear shoe 12. A reinforcing layer 31 is affixed as by gluing to outsole upper surface 18. The layer 31 is made of leatherized paper or cardboard and thus cannot have high rigidity, more especially because cardboard is able to absorb moisture and then becomes very soft.

A peripheral member 22 both retains insert 10 and provides structural support for a peripheral area of the shoe to compensate for the loss of rigidity created by the receptacle 28. The insert 10 comprises an upper base member 32 and a plurality of support elements 34 that are preferably formed integrally with base member 32 to depend therefrom. Accordingly, the sole of Lin is very different from the present invention, and cannot have the same rigidity as the intermediate layer 9 of the invention, which is made of a composite material.

It is noted that Lin himself explains (at column 3, lines 30 to 32) that the purpose of layer 31 is to replace torsional strength lost by the creation of receptacle 28 in midsole member 22. There is therefore no intent in Lin to achieve a stiffer sole; the sole object is to achieve the same rigidity as with normal running shoes, and to compensate for the loss of rigidity created by receptacle 28. The rigidity properties of the cardboard layer 31 vary over time, so that it would not be possible to anchor inserts in such a layer, as can be done in the intermediate layer 9 of the invention.

Lin provides athletic or other activewear shoes which may be relatively soft because they are used for walking, running and the like, while applicants' invention is designed most notably for mountain sports, e.g., cross-country skiing, Nordic hiking and mountain hiking in general, and hence requires a very rigid sole compared with that of Lin.

The Examiner has rejected claim 2 under 35 USC 103 as being unpatentable over Nichols in view of Hiles.

Applicants were unable to find in Hiles any basis for the Examiner's assertion that "Hiles teaches a cushioning material for use in an athletic shoe", and would appreciate being referred to the relevant disclosure. As explained at column l, lines 4 to 12, Hiles relates to energy absorbing materials for use in automobile bumpers and other devices intended to protect against damage due to impact, shock or collision, and for use in the absorption of sound. Upon impact, elastomeric layer 1 will deform first and absorb all low energy impacts. Heavier impacts deform the less compressible layer 2 and, in extreme cases, fracture the hollow bodies 3.

The structure and function of Hiles are completely different from those of the invention, and it would not occur to those skilled in the art to choose the materials used in the reference to solve the problem of producing a shoe sole adaptable to various sports, for several reasons:

The abrasion and weather resistant skin 4 of Hiles are of no use in a shoe.

The metal backing plate of Hiles , unlike applicants' intermediate layer, does not allow for the selection of varying degrees of stiffness, and elastomeric layer 1 of Hiles, unlike applicants' comfort layer, does not provide comfort.

The density of the material used by Hiles does not increase from the upper to the lower surface; there are merely different layers of different density juxtaposed side by side. Contrary to the Examiner's suggestion, to provide a shoe with a comfort layer of increasing density does not add stability to the shoe. Applicants' intermediate layer does so only because it has different and suitable selected stiffness values.

The Examiner has further rejected claims 3 and 19 to 21 under 35 USC 103 as being unpatentable over Nichols in view of Banich et al.

Banich discloses an athletic shoe having an outsole 18, an upper 12, and a midsole subassembly 16 therebetween, formed of several components bonded into an integral structure. The shoe has a lower layer composed of a rear

portion 40 and a toe-c pad 42. This rear portion 40 ex ds from the rear of the shoe toward the toe of the shoe, but terminates short of the front end of the shoe in a tapered front zone. Bonded to the upper surface of portion 40 is an upper layer 44, elevating the heel of the foot and tapering downwardly forwardly under the instep of the foot to terminate short of the ball of the foot and short of toe-off pad 42. At the heel of the upper layer, it forms a roll bar wedge of overlying, laterally tapered wedge portions of different density.

Those skilled in the art would have no inducement to combine the disclosures of Nichols and Banich, if only because the Banich shoe is intended for sports involving running, and thus is adapted to motions entirely different from the trekking and cross-country skiing motions for which applicants' invention is intended. It is noted that the invention does not involve tapered zones or a roll bar wedge as shown in Banich. Moreover, it would not be obvious from the references, considered singly or in the cited combination, to identify the optimum or workable ranges of properties for which suitable materials must be selected for each of the sole layers.

The claims in their amended form are deemed to distinguish patentably over the art of record, and their allowance is accordingly solicited.

Respectfully submitted,

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202-331-7111

February 7, 1994 (filed Monday after Saturday due date)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Quellais et al

Serial No: 08/319,096 Group: 3208

Filed: October 6, 1994 Examiner: Cicconi

Entitled: MULTILAYER SOLE FOR SPORT SHOES

AMENDMENT

Honorable Commissioner of
Patents and Trademarks
Washington, D. C. 20231

Sir:

In response to the Office Action dated March 27, 1995, please amend the subject application as follows:

In the Claims

Please amend the claims as follows:

2/1 (twice amended). [Sole for] In a sport shoe comprising an upper, a sole made from a laminated profile comprising several layers performing distinct functions, respectively, said sole being surmounted by [an] said upper, wherein said sole comprises at least three layers external to said upper, namely:

(a) a ground contact layer with determinate properties of flexibility, gripping and abrasion-resistance which provide good foot extension, good ground traction and a high level of wear resistance;

(b) an upper comfort layer located directly beneath the foot, said upper comfort layer having elastic shock-absorption properties and being assembled on said upper of said shoe; and

(c) an intermediate layer of said sole, arranged directly between an upper part of said ground contact layer, by one of its faces, and the lower part of said comfort layer by its other face, having controlled torsional and flectional rigidity, and providing both for the distribution of shockwaves and stresses sensed by said ground contact layer and for their diffusion over said comfort layer before coming in contact with the foot, said intermediate layer extending over an entire surface of said ground contact layer and constituting a framework for the ground contact layer preventing deformation of the ground contact layer and thereby permitting it to be made of softer, more adherent rubber.

In claim 29, line 2, delete "i.e.," in favor of --said zones including--.

In claim 37:

on line 1, delete "each of";

on line 2, delete "extends over the entire surface of said sole" in favor of --are substantially congruous--.

Discussion

Claims 27 to 40 are pending in this application, claims 5 to 18 being non-elected.

Claims 27, 29 and 37 have been amended in order to overcome the indefiniteness rejections under 35 USC 112, second paragraph.

In his 35 USC 112, first paragraph rejection, the Examiner continues to assert that the comfort layer material must be specifically identified. Presumably, this rejection is based on the presence of claim 28, in which the increase in density from the upper to the lower portion of the comfort layer is claimed.

It is submitted that conventional structural foams of the kind used in comfort soles can be given a density which varies from their upper to their lower portions due to the so-called "skin effect". Such foams have an external

"skin" which has a greater density than the interior of the foam layer.

The attached Exhibit A shows how the varying density of structural foams can be obtained by controlling the flow of pressurizing gas. Samples of soles containing areas of varying density are also available for presentation at an Office interview, should the Examiner consider this necessary for allowance of the application.

The Examiner has rejected claims 27, 28, 30, 34 and 36 to 40 under 35 USC as being unpatentable over Barry et al.'130 in view of Hannibal.

Applicants agree that Barry shows an outer sole (16) made of rubber, an intermediate layer (spring plate 20) having controlled torsional and flectional rigidity, and an upper comfort layer (18). However, the intermediate plate does not extend over the the entire surface of the ground contact layer and thus does not constitute a framework preventing deformation of the latter permitting it to be made of softer, more adherent rubber. The Examiner states that all three layers of Barry extend across the entire "length" of the composite sole, but claim 27 recites applicants' intermediate layer as extending over the entire "surface" of the ground layer; this is a rather important difference, given the functions of the respective layers.

In Barry, the intermediate layer (20) does not extend over the entire surface of the ground contact layer (16) (a) in order to allow adequate adhesive area between the overlying midsole and the underlying outsole (see column 4, lines 60 to 65), and (b) most importantly, to avoid an increase in the rate and degree of pronation, which would increase the potential for injury (see column 5, lines 8 to 11).

The limitations "spring plate being more narrow than the midsole . . . leaving the lateral portion of said outsole in the heel region in engagement with the lateral portion of said midsole in said heel region" are explicitly recited in the independent claims of Barry, and are described in the specification (e.g., at column 2, lines 13 to 20; column 4, lines 60 to 65; column 5, lines 3 to 13; and column 6, lines 42 to 45).

In summary, Barry teaches a rigid elastic layer in contact with the ground contact layer but not extending over the entire surface of the latter in order to avoid the problem of excessive pronation.

Hannibal concerns a composite shoe sole including a composite inner sole (30) at the top of a midsole plus wedge (18, 20) whose thickness diminishes from the heel toward the midfoot and toe region (see Figure 2 and column 4, lines 19 to 23). As correctly noted by the Examiner, Hannibal is also concerned with the lateral stability of the foot, and attempts to address this problem by placing the composite inner sole above the midsole and by tapering the sole assembly inwardly from bottom to top, as shown in Figure 2.

Thus, Hannibal does not show the composite layer (30) extending over the entire surface of the ground contact layer (16), since it is located at the narrow top of the tapered assembly, and hence necessarily covers a lesser surface than the ground contact layer.

The attached Exhibit B illustrates the respective layer arrangements of the present invention and of the two references.

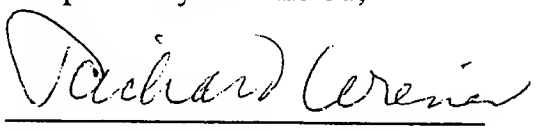
The combination of Barry and Hannibal could not possible meet the recitation of claim 27 that the intermediate layer extends over the entire surface of the ground contact layer. Moreover, the proposed combination is infeasible inasmuch as the two references contain inconsistent teachings, in that the intermediate layer (20) of Barry is in direct contact with the ground contact layer (16), whereas the composite layer (30) of Hannibal is remote from the ground contact layer (16).

Finally, one of the basic objects of the present invention, namely, to increase the gripping action of the outsole, which is achieved by the intermediate layer in direct contact with the ground contact layer **over the entire surface thereof**, is neither mentioned in the two references nor achievable by the structures disclosed therein.

The remaining prior art rejections relate to dependent claims which are allowable together with an allowable main claim.

The claims as now amended are deemed to distinguish patentably over the art of record, and their allowance is accordingly solicited.

Respectfully submitted,



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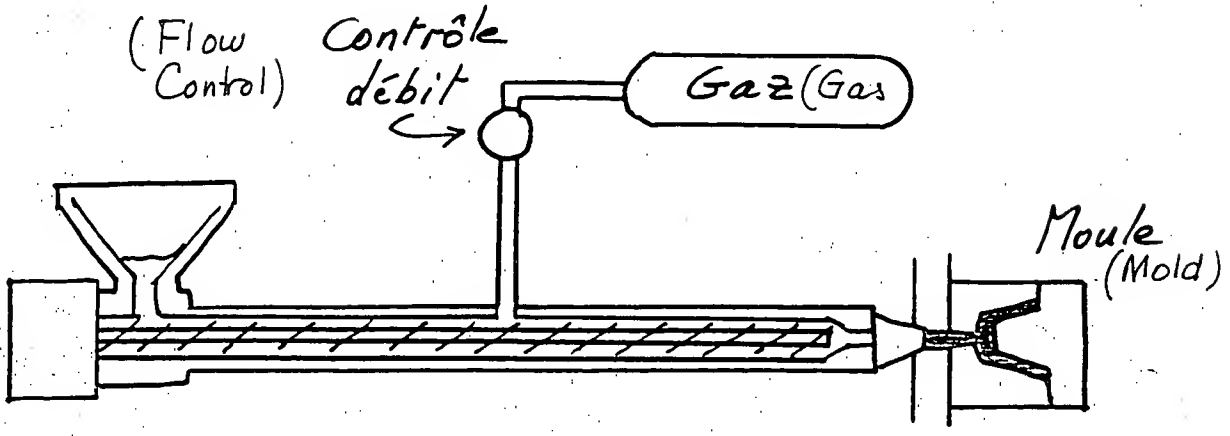
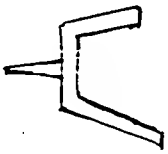
August 24, 1995

Exhibit A

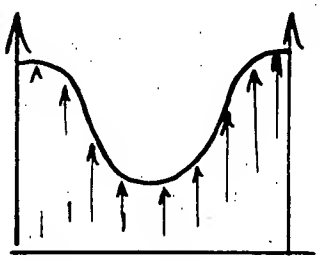
Mousses structurales
(Structural Foams)





Pièce expansée (expanded piece)

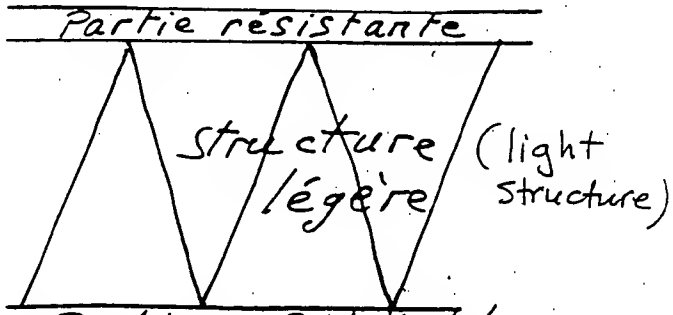
(Section View)
Profil en coupe



Profil de répartition de densité

analogue à une poutre

(analog to a beam)



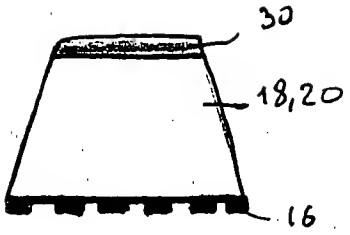


FIG A
HANNIBAL '445

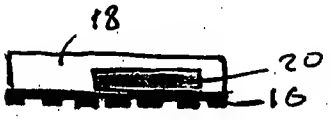


FIG B
BARRY '130

FIG C
SALOMON (Quellais et al.)

#23 4/30/96

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BOX AF
EXPEDITED PROCEDURE

Applicant:	Quellais et al		
Serial No:	08/319,096	Group:	3208
Filed:	October 6, 1994	Examiner:	Cicconi

Entitled: MULTILAYER SOLE FOR SPORT SHOES

Attorney Docket: 254/126

AMENDMENT FILED UNDER RULE 1.116

Assistant Commissioner for Patents
Washington, D. C. 20231

April 18, 1996

Sir:

In response to the Office Action dated November 21, 1995, please amend the subject application as follows:

IN THE CLAIMS

Cancel claim 28.

Cancel claim 37.

Please add the following claim:

41. Sole according to claim 27, wherein said ground contact layer, said upper comfort layer and said intermediate layer are substantially congruous with one another.--

DISCUSSION

Claims 27, 29 to 36 and 38 to 41 are pending in this application.

The Examiner's objection to the specification and to claim 8 under 35 USC §112, first paragraph is mooted by the cancellation of claim 28.

The Examiner's refusal to amend claim 37 due to alleged non-compliance with 37 CFR §1.121 is traversed, inasmuch as the proposed amendment added only three new words, hence meeting the requirements of 37 CFR §1.121(c)(2). To advance the prosecution, applicants have rewritten the claim more or less as proposed by the Examiner.

The Examiner has maintained unchanged his 35 USC §103 rejection of claims 27, 28, 30, 34 36 to 40, on the ground that applicants' arguments are unpersuasive. The Examiner contends that the fact that the intermediate layer of Hannibal does not extend over the entire surface of the ground contact layer is not dispositive of the obviousness issue, inasmuch as applicants' claim 27 merely requires that the intermediate layer having controlled torsional and flectional rigidity cover the entire surface of the facing layers, and inasmuch as Hannibal obviously teaches that lateral rearfoot stability and pronation reduction may also be achieved in an intermediate layer extending over the entire surface of its facing layers.

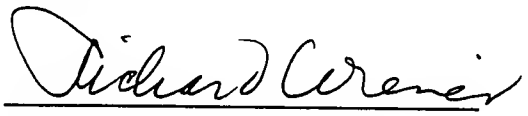
The Examiner's contentions appear to miss the point of the present invention, which provides for an intermediate layer which extends over the entire surface of the ground contact layer in order to (1) assure the distribution of shockwaves and stresses, and (2) provide a framework preventing generalized deformations of the ground contact layer (in the manner of the radial casing of an automobile tire), thereby promoting increased gripping of the ground contact layer and hence a substantial increase in its effectiveness. Such an effect cannot be achieved by the tapered configuration shown in Figure 2 of Hannibal, in which the "intermediate layer" 20 is merely a heel lift which, together with the mid-sole 18, provides cushioning to reduce the vertical impact of heel strike on the foot (see column 4, lines 24-27), in the manner of foam rubber inserts used for heel injuries.

It follows that the limitation "extending over an entire surface of said ground contact layer" renders applicants' claim 27 non-obvious, inasmuch as it distinguishes not only in terms of structure but also in terms of intended purpose.

The Examiner is requested to reconsider his rejection in the light of the foregoing discussion, and to allow the rejected claims over the art of record.

Applicants advise that the enhanced gripping effectiveness of the ground contact layer achieved by the present invention has been proven by tests, the results of which can be made available for the Examiner's review if desired.

Respectfully submitted,



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#27

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant: Quellais et al. Attorney Docket: 254/126

Serial No.: 08/319,096 Group: 3208

Filed: October 6, 1994 Examiner: Cicconi

Entitled: MULTILAYER SOLE FOR SPORT SHOES

BRIEF ON APPEAL UNDER 37 CFR §1.192

Assistant Commissioner for Patents
Washington, D. C. 20231

July 15, 1996
(Filed under the next business day rule.)

Sir:

This is an appeal from the final rejection of claims 27, 29 to 36 and 38 to 41 by the Primary Examiner. Three copies of the rejected claims are attached hereto.

I. Real Party in Interest

The real party in interest is the party named in the caption of this brief.

II. Related Appeals and Interferences

Appellants and their legal representatives and assignee are not aware of any other appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. Status of claims

This is a continuation of U. S. Application Serial No. 07/995,083, filed on December 22, 1992 with claims 1 to 26, of which claims 1 to 9, 12, 13 and 19 to 26 were elected. In addition to the latter claims, the Examiner withdrew claims 5 to 9, 12 and 13 as not corresponding to the elected species.

In response to the Office Action dated October 5, 1993, applicants replaced the remaining elected claims (1 to 4 and 19 to 26) with new claims 27 to 40, which were finally rejected on the merits. The same claims, slightly amended, were filed in the subject continuation application, and were again finally rejected.

IV. Status of Amendments

After final rejection, applicants cancelled claims 28 and 37. The latter claim was reasserted (as new claim 41) to overcome the Examiner's formal rejection.

V. Summary of Invention

As described particularly at page 9, line 2 to page 10, line 14, and as illustrated in Figures 1 to 4 of the drawings, the invention relates to a sport shoe (1) comprising an outer sole (2) made up of several layers performing distinct functions. The lowest or contact layer (7) provides flexibility, gripping and abrasion resistance, allowing good foot extension and ground traction as well as wear resistance. The uppermost or comfort layer (8), which is located directly below the foot, provides elastic shock-absorption, and the intermediate layer or rib (9) provides torsional and flectional rigidity, assuring distribution of shock areas sensed by the contact layer (7) and their diffusion over the comfort layer (8) before contact with the foot. In the elected Figures 1 to 4 embodiment, the comfort layer comprises a highly elastic zone (8a) corresponding to the heel, a zone of medium elasticity (8b) corresponding to the arch, and a third zone (8c) of low elasticity controlling walking.

VI. Issues

A. Does the specification provide an enabling disclosure within the meaning of 35 USC §112, first paragraph?

B. Are claims 27, 30, 34, 36 and 38 to 41 patentable over Barry et al. in view of Hannibal, within the meaning of 35 USC §103?

C. Are claims 29 and 31 to 33 patentable over Barry et al. in view of Hannibal and further in view of Banich et al., within the meaning of 35 USC §103?

D. Is claim 35 patentable over Barry et al. in view of Hannibal and further in view of Funck, within the meaning of 35 USC §103?

VII. Grouping of Claims

The claims listed under each of issues B and C stand or fall together.

VIII. Argument

A. The specification does provide an enabling disclosure within the meaning of 35 USC §112, first paragraph.

The Examiner asserts that the material of applicants' comfort layer (8) must be specifically identified, inasmuch as the mere mention of an unspecified material is insufficient to allow those of ordinary skill in the art to make and use the same without undue experimentation and unreasonable delay. The Examiner denies that the materials provided by applicants by way of example achieve the claimed gradual increase in density.

It appears that this rejection is mooted by the cancellation of claim 28, which recites the comfort layer material.

B. Claims 27, 30, 34, 36 and 38 to 41 are patentable over Barry et al. in view of Hannibal, within the meaning of 35 USC §103.

Applicants agree that Barry shows an outer sole (16) made of rubber, an intermediate layer (spring plate 20) having controlled torsional and flectional rigidity, and an upper comfort layer (18). However, the intermediate plate does not extend over the entire surface of the ground contact layer and thus does not constitute a framework

preventing deformation of the latter permitting it to be made of softer, more adherent rubber. The Examiner states that all three layers of Barry extend across the entire "length" of the composite sole, but claim 27 recites applicants' intermediate layer as extending over the entire "surface" of the ground layer; this is a rather important difference, given the functions of the respective layers.

In Barry, the intermediate layer (20) does not extend over the entire surface of the ground contact layer (16) (a) in order to allow adequate adhesive area between the overlying midsole and the underlying outsole (see column 4, lines 60 to 65), and (b) most importantly, to avoid an increase in the rate and degree of pronation, which would increase the potential for injury (see column 5, lines 8 to 11).

The limitations "spring plate being more narrow than the midsole . . . leaving the lateral portion of said outsole in the heel region in engagement with the lateral portion of said midsole in said heel region" are explicitly recited in the independent claims of Barry, and are described in the specification (e.g., at column 2, lines 13 to 20; column 4, lines 60 to 65; column 5, lines 3 to 13; and column 6, lines 42 to 45).

In summary, Barry teaches a rigid elastic layer in contact with the ground contact layer but not extending over the entire surface of the latter in order to avoid the problem of excessive pronation.

Hannibal concerns a composite shoe sole including a composite inner sole (30) at the top of a midsole plus wedge (18, 20) whose thickness diminishes from the heel toward the midfoot and toe region (see Figure 2 and column 4, lines 19 to 23). As correctly noted by the Examiner, Hannibal is also concerned with the lateral stability of the foot, and attempts to address this problem by placing the composite inner sole above the midsole and by tapering the sole assembly inwardly from bottom to top, as shown in Figure 2.

Thus, Hannibal does not show the composite layer (30) extending over the entire surface of the ground contact layer (16), since it is located at the narrow top of the

tapered assembly, and hence necessarily covers a lesser surface than the ground contact layer.

During the prosecution, applicants submitted an exhibit (B) illustrating the respective layer arrangements of the present invention and of the two references.

The combination of Barry and Hannibal could not possibly meet the recitation of claim 27 that the intermediate layer extends over the entire surface of the ground contact layer. Moreover, the proposed combination is infeasible inasmuch as the two references contain inconsistent teachings, in that the intermediate layer (20) of Barry is in direct contact with the ground contact layer (16), whereas the composite layer (30) of Hannibal is remote from the ground contact layer (16).

Finally, one of the basic objects of the present invention, namely, to increase the gripping action of the outsole, which is achieved by the intermediate layer in direct contact with the ground contact layer **over the entire surface thereof**, is neither mentioned in the two references nor achievable by the structures disclosed therein.

C. Claims 29 and 31 to 33 are patentable over Barry et al. in view of Hannibal, further in view of Banich et al., within the meaning of 35 USC §103.

Claims 29 and 31 to 33 are all dependent on claim 27, which applicants regard as containing allowable subject matter.

D. Claim 35 is patentable over Barry et al. in view of Hannibal, further in view of Funck, within the meaning of 35 USC §103.

Claim 35 is dependent on claim 27, which applicants regard as containing allowable subject matter.

IX. Prayer

The Board is respectfully requested to remand the subject application to the Primary Examiner with the direction to allow all of the appealed claims.

Respectfully submitted,

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202-331-7111

X. Claims on Appeal

27. In a sport shoe comprising an upper, a sole made from a laminated profile comprising several layers performing distinct functions, respectively, said sole being surmounted by said upper, wherein said sole comprises at least three layers external to said upper, namely:

(a) a ground contact layer with determinate properties of flexibility, gripping and abrasion-resistance which provide good foot extension, good ground traction and a high level of wear resistance;

(b) an upper comfort layer located directly beneath the foot, said upper comfort layer having elastic shock-absorption properties and being assembled on said upper of said shoe; and

(c) an intermediate layer of said sole, arranged directly between an upper part of said ground contact layer, by one of its faces, and the lower part of said comfort layer by its other face, having controlled torsional and flectional rigidity, and providing both for the distribution of shockwaves and stresses sensed by said ground contact layer and for their diffusion over said comfort layer before coming in contact with the foot, said intermediate layer extending over an entire surface of said ground contact layer and constituting a framework for the ground contact layer preventing deformation of the ground contact layer and thereby permitting it to be made of softer, more adherent rubber.

29. Sole according to claim 27, wherein said comfort layer is composed of several distinct adjoining zones, said zones including a first zone corresponding to the heel and having a first degree of elasticity; a second zone corresponding to the arch and having a degree of elasticity less than said first zone; and a third zone having a degree of elasticity less than said second zone and promoting control of walking.

30. Sole according to claim 27, wherein said intermediate layer has a substantially constant rigidity at all points, said rigidity being selected during manufacture as a function of intended use of the shoe.

31. Sole according to claim 27, wherein said intermediate layer has a hardness greater than 45 Shore D.

32. Sole according to claim 27, wherein said ground contact layer has a hardness of less than 45 Shore D.

33. Sole according to claim 27, wherein said comfort layer has a hardness of less than 80 Shore A.

34. Sole according to claim 27, wherein said ground contact layer is made of rubber having traction and abrasion-resistance properties.

35. Sole according to claim 27, wherein said ground contact sole is made of a thermoplastic material.

36. Sole according to claim 29, wherein said intermediate layer is made of a material selected from the group consisting of filled and unfilled thermoplastic material.

38. Sole according to claim 27, wherein said layers constituting said sole are connected by adhesive bonding.

39. Sole according to claim 27, wherein said layers constituting said sole are connected by duplicate molding.

40. Sole according to claim 27, wherein said layers constituting said sole are connected by ultrasound.

41. Sole according to claim 27, wherein said ground contact layer, said upper comfort layer and said intermediate layer are substantially congruous with one another.

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 31

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte JACQUES QUELLAIS
and FRANCOIS GIRARD

Appeal No. 1997-1268
Application 08/319,096[1]

ON BRIEF

Before THOMAS, BARRETT, and LALL, Administrative Patent Judges.

BARRETT, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the final rejection of claims 27, 29-36, and 38-41.

We reverse.

[1] Application for patent filed October 6, 1994, entitled "Multilayer Sole For Sport Shoes," which is a continuation of Application 07/995,083, filed December 22, 1992, now abandoned, which claims the foreign filing priority benefit under 35 U.S.C. § 119 of French Application 91 16275, filed December 24, 1991.

BACKGROUND

The disclosed invention is directed to a sport shoe comprising an outer sole made up of three layers performing distinct functions.

Claim 27, the sole independent claim, is reproduced below.

> 27. In a sport shoe comprising an upper, a sole made from a laminated profile comprising several layers performing distinct functions, respectively, said sole being surmounted by said upper, wherein said sole comprises at least three layers external to said upper, namely:
>
> (a) a ground contact layer with determinate properties of flexibility, gripping and abrasion-resistance which provide good foot extension, good ground traction and a high level of wear resistance;
>
> (b) an upper comfort layer located directly beneath the foot, said upper comfort layer having elastic shock-absorption properties and being assembled on said upper of said shoe; and
>
> (c) an intermediate layer of said sole, arranged directly between an upper part of said ground contact layer, by one of its faces, and the lower part of said comfort layer by its other face, having controlled torsional and flectional rigidity, and providing both for the distribution of shockwaves and stresses sensed by said ground contact layer and for their diffusion over said comfort layer before coming in contact with the foot, said intermediate layer extending over an entire surface of said ground contact layer and constituting a framework for the ground contact layer preventing deformation of the ground contact layer and thereby permitting it to be made of softer, more adherent rubber.

The Examiner relies on the following prior art:

Funck	4,399,620	August 23, 1983
Hannibal	4,651,445	March 24, 1987
Banich et al. (Banich)	4,694,591	September 22, 1987
Barry et al. (Barry)	5,052,130	October 1, 1991

Claims 27, 30, 34, 36[2], and 38-41 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Barry and Hannibal.

Claims 29 and 31-33 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Barry, Hannibal, and Banich.

Claim 35 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Barry, Hannibal, and Funck.

We refer to the Final Rejection (Paper No. 21) (pages referred to as "FR__") and the Examiner's Answer (Paper No. 28) (pages referred to as "EA__") for a statement of the Examiner's position and to the Appeal Brief (Paper No. 27) (pages referred to as "Br__") for a statement of Appellants' arguments thereagainst.

OPINION

The claims are argued as standing or falling together with independent claim 27. Therefore, we examine the teachings of Barry and Hannibal applied to this claim.

Appellants admit "that Barry shows an outer sole (16) made of rubber, an intermediate layer (spring plate 20) having controlled torsional and flectional rigidity, and an upper comfort layer (18)" (Br3). As shown in figure 4, the spring

[2] Since claim 36 depends from claim 29, it should be grouped with the rejection of claim 29.

plate 20 terminates a small amount from the front and heel ends of the midsole "to prevent the rather sharp edges of the plate from cutting anything or anyone, and to allow adequate adhesive area between the overlying midsole and the underlying outsole in these areas" (col. 4, lines 62-65). "The spring plate is tapered down in the rear to extend primarily beneath the medial portion of the heel region, and not significantly beneath the lateral portion of the heel region, leaving the lateral heel area with the lateral outsole portion directly in engagement with the midsole" (col. 2, lines 13-18) which "results in enhanced rear foot stability while maintaining shock absorption of the lateral heel portion of the midsole" (col. 2, lines 19-21). "If the plate extended beneath the outside, i.e., lateral area of the heel, the additional torsional stiffness would increase the rate and degree of pronation, increasing the potential for injury." (Col. 5, lines 8-11.)

Hannibal discloses a composite shoe sole having a multiple ply inner sole 30 at the top of a midsole 14 plus heel lift 20 and an outer sole layer 16.

Exhibit B attached to the amendment (Paper No. 20) filed August 25, 1995, illustrates the respective layer arrangements of the present invention (Quellais et al.) and the two references to Barry and Hannibal.

The Examiner reasons (FR5): "it would have been obvious to one having ordinary skill in the art to provide the sole construction of Barry et al. '130 with the sole plate of Hannibal in lieu of the sole plate disclosed therein because such stability devices are art recognized equivalents and substituting one for the other provides the shoe of Barry et al. '130 with lateral stability in the rearfoot area and provides high compliance about the forward roll axis while reducing pronation, as taught by Hannibal."

Appellants argue that "the proposed combination is infeasible inasmuch as the two references contain inconsistent teachings, in that the intermediate layer (20) of Barry is in direct contact with the ground contact layer (16), whereas the composite layer (37) of Hannibal is remote from the ground contact layer (16)" (Br5).

We find no motivation in the references to do what the Examiner suggests. Barry teaches against having the spring plate 20 "extending over an entire surface of said ground contact layer" as claimed. Barry teaches that the spring plate should not extend to the edge at the front "to prevent the rather sharp edges of the plate from cutting anything or anyone, and to allow adequate adhesive area between the overlying midsole and the underlying outsole in these areas" (col. 4, lines 62-65). Barry teaches that the spring plate

should not extend to the edge at the rear because "[i]f the plate extended beneath the outside, i.e., lateral area of the heel, the additional torsional stiffness would increase the rate and degree of pronation, increasing the potential for injury" (col. 5, lines 8-11). The Examiner has not dealt with these teachings against doing what the Examiner proposes. For example, the Examiner states that extending the sole plate in Barry would reduce pronation, which contradicts Barry.

Although it might be said that it would have been obvious to one of ordinary skill in the art to extend the spring plate to the edges if one was not concerned with the factors mentioned by Barry, such analysis seems tinged with hindsight. It would seem that there should be margin between the spring plate and the edges at least to allow an adhesive area.

While it may be true that the inner sole 30 comprising a composite laminate in Hannibal is structurally similar to the spring plate 20 comprising the composite laminate in Barry, the different order of the layers in Hannibal makes it difficult to see how its teachings are applicable to modifying Barry. The biomechanics of the shoe are clearly going to depend on the order of the layers. The composite laminate inner sole 30 is the top layer in Hannibal and clearly has to extend over the entire surface of the mid sole 18 and heel lift 20 to distribute forces thereover. In Barry, the midsole 18 is at

the top and distributes forces over the composite laminate spring plate 20 and the outer sole 16. We do not find any motivation in Hannibal to place the composite laminate between the outer sole and the midsole as in Barry. Barry teaches that if the composite layer is between the outer sole and the midsole, it should not extend over the entire surface of the outer sole. Therefore, we are not persuaded that it would have been obvious to one of ordinary skill in the art to extend the spring plate 20 in Barry over the entire surface of the outer sole 16, just because Hannibal discloses three layers, each layer of which extend entirely over the layer below.

For the reasons stated above, we conclude that the Examiner has failed to establish a prima facie case of obviousness with respect to independent claim 27. Accordingly, the rejection of claims 27, 30, 34, and 38-41 is reversed.

Banich and Funck do not cure the deficiencies of Barry and Hannibal as to the rejection of claim 27. Accordingly, the rejections of claims 29, 31-33, 35, and 36 are reversed.

CONCLUSION

The rejections of claims 27, 29-36, and 38-41 are reversed.

REVERSED

JAMES D. THOMAS)
Administrative Patent Judge)
)
)
)
LEE E. BARRETT)
Administrative Patent Judge) BOARD OF PATENT
) APPEALS
) AND
) INTERFERENCES
)
)
PARSHOTAM S. LALL)
Administrative Patent Judge)

28. In a sport shoe comprising an upper, a sole made from a laminated profile comprising several layers performing distinct functions, respectively, said sole being surmounted by said upper, wherein said sole comprises at least three layers external to said upper, namely:

(a) a ground contact layer with determinate properties of flexibility, gripping and abrasion-resistance which provide good foot extension, good ground traction and a high level of wear resistance;

(b) an upper comfort layer located directly beneath the foot, said upper comfort layer having elastic shock-absorption properties and being assembled on said upper of said shoe; and

(c) an intermediate layer of said sole, arranged directly between an upper part of said ground contact layer, by one if its faces, and the lower part of said comfort layer by its other face, having controlled torsional and flectional rigidity, and providing both for the distribution of shockwaves and stresses sensed by said ground contact layer and for their diffusion over said comfort layer before coming in contact with the foot, said intermediate layer extending over **substantially** an entire surface of said ground contact layer **which is located directly beneath a foot of a person wearing the sport shoe,** and constituting a framework for the ground contact layer preventing deformation of the ground contact layer and thereby permitting it to be made of softer, more adherent rubber.

29. In a sport shoe comprising an upper, a sole made from a laminated profile comprising several layers performing distinct functions, respectively, said sole being surmounted by said upper, wherein said sole comprises at least three layers external to said upper, namely:

(a) a ground contact layer with determinate properties of flexibility, gripping and abrasion-resistance which provide good foot extension, good ground traction and a high level of wear resistance;

(b) an upper comfort layer located directly beneath the foot, said upper comfort layer having elastic shock-absorption properties and being assembled on said

upper of said shoe; and

(c) an intermediate layer of said sole, arranged directly between an upper part of said ground contact layer, by one if its faces, and the lower part of said comfort layer by its other face, having controlled torsional and flectional rigidity, and providing both for the distribution of shockwaves and stresses sensed by said ground contact layer and for their diffusion over said comfort layer before coming in contact with the foot, said intermediate layer extending over **at least a** [an entire] surface of said ground contact layer **which is directly beneath a lateral portion of a heel of a person wearing the sport shoe,** and constituting a framework for the ground contact layer preventing deformation of the ground contact layer and thereby permitting it to be made of softer, more adherent rubber.

Consommation et Corporations Canada
Consumer and Corporate Affairs Canada

Bureau des brevets
Patent Office

Ottawa, Canada
K1A 0C9

(11) 2,003,132
(22) 1989/11/16
(43) 1990/06/13
(52)

(19) (CA) **APPLICATION FOR CANADIAN PATENT** (12)

(54) Inlay for a Shoe

(72) Mayer, Helmut - Germany (Federal Republic of) ;

(73) Mayer, Helmut - Germany (Federal Republic of) ;

(30) (DE) G 88 15 448.3 1988/12/13
(DE) G 89 04 336.7 1989/04/07
(DE) G 89 05 979.4 1989/05/12
(EP) 89 119 833.5 1989/10/25

(57) 25 Claims

ABSTRACT

The invention provides an inlay for a sole of a shoe, in particular a sport shoe, extending at least in the region of the forefoot, and preferably within the entire area of the sole. This inlay is characterised in that it possesses, at least in the region of the forefoot and in the transverse direction of the sole, high stiffness against bending, whereas vertically in the longitudinal direction of the sole its stiffness against bending is low. In addition, the invention provides a sole comprising such an inlay, as well as a shoe comprising such as sole.

2003132

Inlay for a shoe

The invention relates to an inlay for a shoe, in particular for a sport shoe, extending at least within the forefoot region of the sole, and preferably within the entire region of the foot. In addition, the invention relates to a sole provided with such an inlay and to a shoe having such a sole.

With shoes in general and in particular with sport shoes such as, for instance, shoes for light athletics, mountaineering shoes, golf shoes etc. it is important to design the shoe in such a manner that the risk of the foot snapping over towards the side and hence the risk of ligaments tearing or being strained is as small as possible. This risk of the foot snapping over towards the side is the larger, the higher is the laterally directed tilting movement acting upon the foot and the lower is, on the other hand, the resistance of the shoe to the lateral tilting moment. These two factors, i.e. the tilting moment on the one hand and the resistance of the shoe to the tilting moment on the other hand, are, leaving aside the extraneous conditions, determined above all by the design of the shoe:

(1) In the first place, the tilting moment is the larger, the higher is the force component directed towards the side, i.e. the tilting force acting upon the foot. This tilting force depends largely on the extraneous loading conditions, i.e. the loading conditions unaffected by the shoe, which, especially in sporting activities, are very pronounced, as a result of which sport especially leads with relative frequency to ligament tears of strains.

(2) In the second place, the tilting moment is the higher, the longer is, in physical terms, the lever arm, i.e. the greater is the distance between the foot and the ground. This means that all other conditions being equal the tilting movement increases with the thickness of the shoe sole.

(3) Whether a given tilting moment can in fact cause tilting and, as a result, snapping over of the foot towards the side, does not only depend on the absolute value of the tilting moment but also on the moment of resistance which the shoe opposes to a lateral tilting. This moment of resistance is the higher, the greater is the lateral stability of the shoe sole; i.e. the longer is the lever arm of the sole which opposes flexing in the transverse direction of the sole, by which is meant flexing about a flexing line parallel or roughly parallel to the longitudinal direction of the sole.

In the light of the above factors a very thin and stiff shoe sole would be ideal for making the risk of the foot snapping over to the side as low as possible. For if the shoe sole is very thin, the tilting moment is at a minimum, and if the shoe sole is very stiff there is a high moment of resistance which tends to prevent the tilting moment from actually causing lateral tilting. Such a shoe sole is, however, by no means ideal, since yet other requirements apply as regards the characteristics which a shoe should possess.

Whereas the wearer of such a shoe with a very thin and stiff sole would be able to stand well and safely on level ground, i.e. whereas such a shoe would ensure that the wearer's stability on level ground is good, the wearer of such a shoe could run with that shoe only with difficulty and insecurely, and in addition his stability on uneven ground would not be good, for the stiff sole of such a shoe would not adapt itself to uneven ground and make any roll-off motion of the shoe sole while running

on the ground impossible. So as to enable the wearer of the shoe to run well and safely as a result of a good roll-off motion of the shoe sole on the ground, the shoe sole must be soft and flexible. This requirement for making the shoe sole soft and flexible and not rigid, does however, for the reasons below, entail the further requirement that the shoe sole must not be designed so as to be thin, as is, according to the above explanations, desirable in order to reduce the risk of the foot snapping over, but that on the contrary it should be made thick:

For if a soft and flexible shoe sole is thin, point pressures acting from below on the sole of the shoe and caused, e.g. by little stones, unevennesses of the ground etc., are transmitted through the sole of the shoe point-by-point to the sole of the wearer's foot, which is of course extremely uncomfortable and even distressing. In order to alleviate as far as possible such a transmission of point pressures to the sole of the wearer's foot and if possible even prevent it, it is therefore necessary to make the shoe sole, which must be soft and flexible in order to ensure good roll-off motion, as thick as possible.

Hence there are two opposite requirements as regards the design of the shoe sole:

(a) On the one hand the sole should be as thin and rigid as possible in order to make the risk of lateral snapping over of the foot and hence the risk of ligament tears and strains as low as possible.

(b) On the other hand, the sole should be as soft, flexible and thick as possible in order to enable a roll-off motion as required for running as well as secure standing on uneven ground while preventing, to the largest possible degree, the transmission of point pressures due to the ground.

Whereas according to the state of the art shoe soles with a stiffening inlay are known, the proposals as regards these known stiffening inlays are neither intended to provide a shoe sole meeting the two above opposed requirements, nor do these inlays constitute a solution of this problem:

From the British patent GB-A-1 257 524 a stiffening inlay from metal or a plastic material and provided with spikes is known, which is embedded in the sole of the shoe and intended especially for golf shoes. The purpose of this stiffening inlay consists in solving the problems in respect of spike retention and isolation of the foot from the pressure of the spikes when use is made of relatively light, soft and flexible cellular sole materials. Furthermore, uncontrolled flexing of the shoe, in particular uncontrolled torsional flexing of the middle part is to be prevented with such sole materials in order to avoid a reduction of foot comfort and early deformation of the upper part of the shoe. The solution of this problem consists, to the extent to which it is of interest in the present context, in that the generally flat inlay extends over the entire length of the shoe sole and all spikes of the forefoot region are attached to it, whereby the points at which the spikes are attached to the inlay consist in slight indentations. As a result, said stiffening inlay brings about not only the required transverse stiffening within the forefoot region of the shoe sole but the forefoot region is at the same time stiffened also in the longitudinal direction of the sole, as a result of which the roll-off motion of the shoe sole when running is, in undesirable manner, made more difficult.

From the US patent US-A-1 439 937 a stiffening metal inlay is known, which extends from the middle part of the forefoot region of the shoe sole rearward towards the rear end of the heel region and is intended to act as a support in the waist or instep region. The front part of the forefoot region of the shoe sole is, on the other hand, specifically free of the stiffening inlay, so that it remains vertically flexible, which is

necessary for a good roll-off motion, but this has the disadvantage that with such a design the lateral stability is low.

Lastly, a moulded sole made of soft elastic plastic or rubber materials with a tread-through-proof, hard elastic inlay, e.g. made from steel sheet, is known from the European patent application EP-A-44 549, said sole being intended primarily for safety shoes in the construction industry, which are intended to be safe against the penetration of nails through the sole of the shoe. The stiffening inlay, which in the embodiment that is of interest in the present connection extends over virtually the entire length of the shoe sole, is so designed and embedded in the shoe sole that the toe region for supporting a steel toe-cap and the waist region for supporting the joint of the foot are each directly below the insole, whereas, on the other hand, the remaining part of the forefoot region and the heel region of this inlay are recessed so as to enable them to be covered throughout with a layer of soft elastic sole material in order to ensure higher foot comfort in the ball and heel regions than if use is made of a stiffening inlay extending at all points directly below the insole. These recessed regions of the stiffening inlay are brought about by the material of the inlay being bent in steps, along bending lines at right angles to the longitudinal axis of the sole where there is the transition from the given heightened to the given recessed region. However, these bending lines do not modify the stiffness conditions of the inlay significantly, as a result of which the inlay causes virtually the same degree of sole stiffening in the transverse as in the longitudinal direction, thus impeding the roll-off motion of the shoe sole to the same extent to which the transverse stiffness is increased.

On the other hand, the object of the invention consists in particular in providing an inlay for the production of shoes, with which the risk of lateral snapping over of the foot and hence the risk of ligament tears and strains is as low as possible, and which, at the same time, enables excellent roll-off motion of the shoe sole as required for running, in conjunction with optimal stability.

Furthermore, the invention is intended to provide a shce sole and a shoe, in particular a sport shoe, with these characteristics.

According to the invention, this object is achieved by providing an inlay extending at least within t..e forefoot region of the scle and preferably within the entire region therecf, by imparting to the inlay, at least within the forefoot region, in the transverse direction of the sole, in particular in the given roll-off region of the sole, high stiffness against bending, but in the longitudinal direction of the scle low stiffness against bending in vertical direction.

A shoe sole according to the invention is characterised in that it has an inlay according to the invention, which is preferably firmly connected with the sole, i.e. preferably by moulding about said inlay a plastic material, by foaming, injection, casting or some other method, or by vulcanising it into a plastic material, said plastic material forming at least a part of the sole or the entire sole.

Lastly, the invention provides for a shce having a scle accerding to the invention with an inlay according to the invention.

A particularly preferred embodiment of the inlay according to the invention is characterised in that the inlay extends over substantially the entire sole length and that the deformation capacity of said inlay in the longitudinal direction of the scle, from the heel to the large toe, is good. Such an inlay enables torsional movements of the foot, such as are necessary e.g. with many types of light athletics, when golfing, in tennis and with similar activities.

In addition, the inlay according to the invention is made elastically resilient, this being quite especially preferred, as a result of which the shoe sole, time and again, substantially resumes, by itself, its initial positicn.

Lastly the inlay according to the invention is made, in its specially preferred embodiment, pressure-stiff against pressure at right angles to the plane of the sole, which is very important because as a result point pressures due to the ground are distributed over the entire area of the inlay, so that pressures caused by small stones, unevennesses of the ground etc. are not transmitted to the sole of the foot point-by-point.

A quite especially preferred and highly practicable embodiment of the inlay according to the invention, which possesses all the above advantageous properties, is characterised in that the inlay, in particular an inlay made in one piece, consists of hard, springy sheet material and is provided, at least within the forefoot region, and preferably within substantially the entire sole region, with transverse profiling at right angles to the longitudinal direction to the sole, and in particular vertically, whereby said transverse profiling preferably extends over the entire width of the inlay, and whereby the hard, springy sheet material is preferably metal and/or plastic sheet material, preferably steel sheet, and more especially spring steel sheet.

Such an inlay according to the invention, which is excellently suited for sole and shoe manufacture as carried out in practice, combines in itself, in particular, the following advantageous characteristics:

(1) High lateral stability since transverse profiling confers to the inlay a high stiffness against bending in the direction of profiling, i.e. in the transverse direction of the sole, especially in the given roll-off region;

(2) very good vertical flexibility in the longitudinal direction of the sole, especially during the roll-off motion, since transverse profiling confers to the inlay low stiffness against bending at right angles to the direction of profiling and at right angles to the plane in which the profiling extends;

(3) high torsional capacity about the longitudinal direction of the sole from the heel to the large toe, since transverse profiling enables torsion of the individual transverse profiles in respect of one another, about an axis vertical to the individual profiles and in the plane common to the profiles;

(4) good pressure distribution owing to the stiffness against pressure of the hard sheet material of which the inlay is made, such as steel, since this hard sheet material distributes pressures acting from below over the entire area of the inlay;

(5) excellent resilience since the springy sheet material reverts, owing to its springiness, into its initial position, as a result of which a shoe sole provided with the inlay according to the invention resumes its original shape time and again.

The high lateral stability of the inlay according to the invention enables, in conjunction with the good pressure distribution, very flat construction of the shoe soles provided therewith, i.e. the production of thin soles without substantial tilting effect, since the tilting moment is, owing to the low thickness of the sole, as low as possible, and the moment of resistance to tilting is, owing to the high lateral stability, as high as possible, a high degree of foot comfort being achieved at the same time, since point pressures emanating from the ground are not transmitted point-by-point to the sole of the foot and the roll-off motion of the foot while running is facilitated, while, in addition, a thin layer of soft-elastic sole materials on the underside of the inlay is sufficient for adaptation to unevennesses of the ground (high stability).

Investigations have shown that such an inlay according to the invention made from spring steel withstands a minimum of 5 million alternating bending operations without any loss of shape, which means e.g. that the inlay remains stable and suitable for use for about 650 golf tournaments.

An inlay in the form of a one-piece, profiled sheet, in particular with a sole-shaped contour, can, on the one hand, be as such made efficiently and economically, while, on the other hand, it is also possible to integrate it efficiently and economically with the sole of a shoe. These advantages are largely achieved also if the inlay according to the invention is made of a composite material consisting of different layers of material such as e.g. metal and plastic. Such an inlay may consist of strip-shaped zones separated in the transverse direction of the sole, which are connected by the plastic layer in flexibly resilient manner.

The torsional capacity of the inlay from the heel to the large toe can, if required, be further increased by the inlay having, instead of transverse profiling, longitudinal profiling within the waist region and/or the heel region, said longitudinal profiling being in line with the longitudinal direction of the sole. Such longitudinal profiling in the waist region is also advantageous for supporting the joint of the foot.

Although, as already mentioned, it is preferable to design the inlay in such a way that it extends over substantially the entire area of the sole, it may in certain cases be also sufficient for the inlay to extend over substantially the entire width and/or over substantially the entire length of the forefoot region, since this alone yields most of the advantages explained above.

The hard, resilient sheet material may have a thickness between 0.1 mm and 1.5 mm, and preferably between 0.3 mm and 0.8 mm.

The transverse and/or longitudinal profiling may have, in particular, a grooved, fluted, ribbed, channelled, undulating, furrowed or bead-shaped, and preferably a corrugated, zig-zag-shaped or corrugation-like cross-section.

In this connection profiling direction means the direction in which such

profiling is rolled, drawn, extruded etc., i.e. in case of profiling with grooved cross-section the longitudinal direction of every individual groove.

The width of the periodically repeating profile cross-section elements is preferably 3 mm to 20 mm, more especially 6 mm to 16 mm, and by way of special preference 8 mm to 13 mm.

With a view to increasing the anchoring capacity of the inlay in a sole further, it is possible to design the profiling in such a way that it is, in the profiling direction, undulating, serrated, grooved, fluted or furrowed, or has some other secondary profiling at right angles to the direction of profiling, although owing to profiling the inlay according to the invention already has excellent anchoring capacity and such an increase is not required in most of the cases.

For the pressure of the foot to be transmitted to the ground even better, the inlay, especially if it is a one-piece sheet, can be provided, within a predetermined region of the foot or in several predetermined regions of the foot, with a recess in the direction of the ground, preferably within range of the large toe, of the ball of the foot and/or of the heel, whereby said recess has, preferably, a flat or plane bottom, so as to enable the above function to be carried out particularly well.

In order to ensure that, in the course of foaming in etc., the plastic can spread well on both sides of the inlay, the latter can be provided with through-holes for the plastic material, said holes being distributed over the surface of the inlay and provided with one or several injection ducts through which to inject the plastic material, and/or with a multitude or plurality of penetration apertures, which may, in particular, be penetrations.

The inlay according to the invention makes it outstandingly possible for knobs or spikes to be fitted in a non-separable manner or to be replaceably fitted by means of fastening means provided on or within the

inlay. This virtually eliminates all attachment and fastening problems, which otherwise occur when fitting knobs or spikes to a normal sole.

As a point of detail, the above fastening means may be threaded holes provided within the inlay or threaded inserts mounted on the inlay. Particularly stable, especially directionally stable, attachment of knobs or spikes to the inlay can be brought about, according to the invention, by the foot sections of the knobs or spikes or the fasteners such as e.g. threaded inserts being secured within recesses in the inlay and supporting themselves against the side walls of the recesses, that they match the adjacent side walls of the recesses, preferably in positive manner, and/or are firmly attached to said side walls, whereby said recesses are preferably the profile recesses produced by transverse and/or longitudinal profiling. The spikes can also be secured in other ways, e.g. by riveting or welding.

The inlay according to the invention may also consist of a composite sheet material comprising several layers joined with one another so as to produce an integrated composite structure, at least one of said layers being provided with the transverse profiling and preferably consisting of the transverse profiling. Such a composite structure makes it possible to link the advantages of different materials.

It is possible, for instance, for the composite sheet material to have a first layer consisting of a plane, preferably non-profiled flexible and resilient sheet material, and of a second layer designed as a profiled layer and consisting e.g. of individual profiles arranged next to one another, which are connected by bonding, vulcanising etc. with the resilient sheet material, as a result of which the first and the second layer are integrated so as to form a composite material.

This type of construction makes it possible to use for the first layer, the function of which is to act as an elastic flexible bond of the

profiles, a material which is, in particular, resiliently flexible and thin, such as Teflon or, in particular, thin spring steel, while using for the second layer, the special function of which is to confer a high degree of lateral stability to the inlay, a particularly stiff and pressure-resistant material such as special steel or rigid plastic material.

By using a composite sheet material it is also possible to confer special properties to the inlay according to the invention, which cannot be achieved at all or only with great difficulty if use is made of a single-layer sheet material. It is possible, for instance by producing, with the aid of closely adjacent rectangular profiles or U-profiles by way of transverse profiling on a composite sheet material, an inlay which permits flexing of the sole only in the upward direction but not downward, thus e.g. conferring particularly good kicking characteristics to football shoes.

Although the inlay according to the invention can in principle also be used as an "inlaid sole" or inlaid intermediate sole, it is preferable to develop it as an insole or join it firmly with the sole, in order to integrate it, in stable fashion, with the overall structure of the sole and hence the entire shoe, this being possible both by bonding to the sole or vulcanising on to or in the sole, as also by moulding the sole material about the inlay.

The inlay according to the invention can be developed in accordance with the invention as an insole in that the profiling cavities and/or intermediate spaces of the transverse profiling and the longitudinal profiling optionally provided in certain embodiments and other recesses or the like are filled by a filler material preferably firmly connected with the inlay in such a way that inlay and filler material are preferably combined to give a composite material whose upper and/or lower surface is plane.

The invention furthermore provides a sole for a shoe having an inlay according to the invention which is firmly connected with the sole or

forms a component of the sole or in which the sole is an insole of the above-mentioned kind or is firmly connected with such an insole. In such a sole according to the invention a plastic may be foamed, injected, cast or moulded in any other way about the inlay or it may be vulcanised into a plastic material, this plastic material forming at least part of the sole or the filler composition or the entire filler composition.

The inlay, insole or sole according to the invention is suitable for shoes of virtually any kind, whereby the concept "shoes" within the scope of the present invention and claims relates, apart from shoes in the narrow sense such as low shoes, high shoes etc., also to boots, in particular high boots, rubber boots etc. Incidentally, by using the inlay, insole or sole according to the invention the shoes can be produced very economically. Apart from the above advantages, the high lateral stability of the inlay, insole or sole according to the invention causes all shoes to be supported and the plantar arch to be protected while at the same time protecting the ball region, in particular against burn when running, while the elastic resilience of the inlay ensures, inter alia, that the foot is less prone to fatigue.

The inlay, insole or sole according to the invention is advantageous for normal shoes such as street or running shoes, and it is particularly advantageous for sport shoes such as, in particular but by no means exclusively, shoes for light athletics, jogging shoes, shoes for indoor sports, sport shoes for lawn sports, golf shoes, tennis shoes, high-jump shoes, mountaineering shoes etc., while, owing to the outstanding characteristics which it confers to the shoe, its effects are not only such as to make it more useful and protect health but also such as to increase performance, whereby said effects result from the various characteristics such as increased stability, torsional capacity, elastic resilience etc. In the case of golf shoes for instance, to mention but one example, the quality of the strokes is, inter alia, improved owing to improved stability, high roll-off mobility and good torsional capacity. In the high jump it is possible, as has been shown by tests, to achieve greater heights. With

mountaineering shoes the transmission of pressures from below, which in this case is particularly critical owing to the ground conditions such as slopes of boulders, is reduced to a very substantial degree, while owing to the fact that the flat sole construction is possible, the close contact with the ground is, at the same time, considerably improved and the danger of injuries to the feet significantly reduced. This significant reduction of the risk of injury and improvement of close contact with the ground is, incidentally, a very important advantage of the invention whatever the type of sport.

The above as well as other characteristics and advantages of the invention are described in detail below, with reference to especially preferred embodiments and figures 1 to 14 of the drawing, in which such embodiments and details thereof are illustrated:

Figure 1 A top view of a first embodiment of an inlay according to the invention, which extends over the entire area of the sole and is provided with transverse profiling throughout (e.g. at a scale of 1:1 with shoe size 42), as well as an enlarged partial view in perspective of the transverse profiling;

Figure 2 a top view of a second embodiment of an inlay according to the invention, which is similar to the embodiment shown in figure 1, in which however the transverse profiling is characterised by a somewhat larger width of the individual profiles and is provided with through-holes for plastic serving to coat the inlay as it is embedded into a sole with foam or to encase it in some other manner;

Figure 3 a top view of a third embodiment of an inlay according to the invention as well as a cross-section through said inlay, which is similar to the embodiment according to figure 1, but differs from said embodiment in particular in that it has through-holes for fitting spike fasteners and in

that, in the waist region, the transverse profiling partly passes over into longitudinal profiling;

Figure 4 an excerpt from a rectangular corrugated profile which may be provided by way of profiling in various embodiments;

Figure 5 an excerpt of a trapezoidal corrugated profile provided with secondary profiling;

Figure 6 an excerpt of a zig-zag profile provided in the embodiments according to figure 3 and figure 7;

Figure 7 a fourth embodiment of an inlay according to the invention which is provided with transverse profiling only in the forefoot region but has a torsional bridge with transverse profiling and/or longitudinal profiling in the waist region (in the present case profiling is provided in the waist region, which extends in longitudinal direction of the torsional bridge extending at an acute angle to the longitudinal direction of the sole) and is provided with longitudinal profiling in the heel region, furthermore through-holes are available for attaching spikes;

Figure 8 a fifth embodiment of an inlay according to the invention, which is provided with recesses for improved transmission of the foot pressure to the ground and with continuous longitudinal profiling in the waist region;

Figure 9 a partial cross-section along the line M-N in figure 8;

Figure 10 a top view of a sole with an inlay indicated by means of a dashed line, which extends only over the area of the forefoot;

Figure 11 a section according to line S-T in figure 10, in which the plastic material by means of which the inlay is foamed into the sole, is, for presentational reasons, not shown;

Figure 12 a longitudinal section of the sole of a sport shoe according to the invention with flat sole and wedge-heel inlay;

Figure 13 a longitudinal section in accordance with figure 12 of a different embodiment of a sport shoe with heel according to the invention;

Figure 14 a much enlarged partial cross-section, not necessarily to scale, of a sheet-type inlay made with a composite inlay comprising several layers which are connected with one another so as to form an integrated unit;

Figure 15 an enlarged partial longitudinal section of a first embodiment of an insole formed of an inlay by filling the profiling cavities and/or intermediate spaces with a filler material so as to form upper and lower, plane surfaces;

Figure 16 an enlarged partial longitudinal section of another embodiment of an insole formed by an inlay with filler composition, the filler composition covering the profiling on both sides; and

Figure 17 an enlarged partial longitudinal section of still another embodiment of an insole consisting of an inlay made plane on both sides by means of a filler composition and a thin inlaid sole (inlay) bonded on one side or lying loosely.

In the figures of the drawing identical or similar components bear the same reference numbers so that as regards such components which bear a reference number in a figure but are not explained reference should be made to the explanations of these parts as given in relation to previous figures.

To begin with, reference is made to figure 1 showing a top view of a first embodiment of an inlay 1 according to the invention. This inlay is made in one piece of hard, resilient sheet material, i.e. preferably spring steel, and extends over the entire area of the sole, that is to say its contour is substantially that of an inlay sole, as shown.

Inlay 1 is provided on its entire surface with transverse profiling which extends in transverse direction Q of the sole and at right angles to longitudinal direction L of the sole. In the left-hand bottom part of figure 1 there is a partial view in perspective of said transverse profiling 2. According to this view said transverse profiling has a trapezoidal corrugated profile with rounded profile edges. These profile edges 3 are drawn in figure 1 in order to characterise the profile direction and the profile period P, whereby the distance between two profile edges 3 in figure 1 corresponds to half a profile period 1/2 P since the flanks of the trapezoidal transverse profiling 2 deviate only slightly from the vertical so that the two profile edges 3, each of which limits one profile flank, coincide in the top view of figure 1 so as to form virtually a single line.

It will be appreciated that in figure 1 and also in the other figures only some of the profile edges shown bear a reference number.

As can be seen in figure 1, the term "profile period" signifies the width of the periodically repeating cross-sectional profile elements, i.e. in this case the width of a trapezoidal ridge A plus a trapezoidal recess B.

Figure 2 shows a further embodiment of an inlay 1 differing from the inlay according to figure 1 substantially by the fact that profile period P of transverse profiling 2 is larger and that the inlay is provided with through-holes 4 designed, in particular, as penetrations. These through-holes 4 distributed over the surface of inlay 1 serve as through-holes

for plastic material when moulding, by foaming, injection, casting or some other method, plastic about the inlay with a view to integrating the inlay into a shoe sole.

In addition, the longitudinal axis C-D, the roll-off axis E-F and the transverse axis G-K of the sole, into which inlay 1 is integrated, are drawn in figure 2.

Transverse profiling 2 of inlay 1 according to figure 2 has preferably the profiling form shown at the bottom of figure 1, but any other profiling form is also possible, for instance one of the profiling forms shown in figures 4, 5 and 6.

Figure 3 shows a top view of a third embodiment of inlay 1 according to the invention as well as a longitudinal section through this inlay which differs in various ways from the embodiments according to figures 1 and 2:

(a) Whereas both in forefoot region 5 and in heel region 7 transverse profiling 2 is provided by way of profiling, waist region 6 is provided with longitudinal profiling 8 extending in the longitudinal direction of inlay 1, whereby said longitudinal profiling passes at the two longitudinal ends of heel region 6 via transitional transverse profiling 9 gradually into transverse profiling 2 of forefoot region 5 and heel region 7.

(b) Transverse profiling 3 as well as longitudinal profiling 8 and also transitional transverse profiling 9 is designed as a zig-zag profile, as shown in the cross-sectional view of figure 3. A partial view of this profile is shown, in perspective manner, in figure 6.

(c) Lastly, inlay 1 of the embodiment according to figure 3 has through-holes 10 for the attachment of threaded lugs or inserts

11 for screwing in knobs or spikes 12 (see figure 3, right, top). So as to be able to attach the threaded lugs or inserts 11 with a wide base 14 in a particularly stable manner to inlay 1 in figure 3, flat regions 13, i.e. regions without transverse profiling 2, are provided about through-holes 10. The method of attaching knobs or spikes described in the specification is only one example for the numerous ways in which these can be attached both permanently or detachably to the inlay according to the invention.

As already mentioned, figures 4, 5 and 6 show partial perspective views of profiles which can be used instead of the profile shown in figure 1, bottom left, by way of transverse profiling 2 and/or longitudinal profiling 8 as well as possibly transitional profiling 9. In this connection it should be noted that the profiles shown are only a few profiles in a multitude of all kinds of profiles suitable for the inlay according to the invention.

Figure 4 shows in particular a rectangular corrugated profile, whereas figure 5 shows a trapezoidal corrugated profile with secondary profiling 15, which is smaller than the trapezoidal corrugated profile and has a profiling direction at right angles to the profiling direction of the trapezoidal corrugated profile. Figure 6 shows, as already mentioned, a zig-zag profile. Profile edges 3 may be rounded to a greater or lesser extent so that the profiles according to figures 4 and 6 can in consequence pass into grooved profiles with grooves of half-round or oval or arch-shaped cross-section, if this is required.

Profile period P is preferably in the range between 3 mm and 20 mm, more especially in the range between 6 mm and 16 mm and by way of special preference in the range between 8 mm and 13 mm, whereas profile height H is preferably in the range between 1 mm and 5 mm, more especially in the range between 2 mm and 3 mm, the hard resilient sheet material of which

inlay 1 is made consisting preferably of metal or plastic material, and, by way of special preference, of spring steel. The thickness of this sheet material depends on the type of material and is in general preferably in the range between 0.5 mm and 1.5 mm.

Figure 7 shows an inlay 1 with transverse profiling 2 in the forefoot region, whereas in the waist and heel regions continuous longitudinal profiling 8 is provided, and with through-holes 10 for direct attachment of spikes or for attaching fastening means for spikes.

Figure 8 shows a top view of a further embodiment of inlay 1 according to the invention, with transverse profiling 2, which is provided in the forefoot region and in the heel region between longitudinal profiling 8 in the waist region, is interrupted by several recesses 16 facing the ground. The recesses can be of circular shape. The three recesses 16 in the forefoot region are in the region of the large toe and the ball of the foot, whereas rear recess 16 is in the region of the heel.

These recesses 16 serve for better transmission of the foot pressure to the floor. As can be seen in figure 9, which shows a cross-section along line M-N in figure 8 of one of the recesses, base 17 of recess 16 is flat or level and, as a result, at the lowest profiling level closest to the floor.

Figure 10 shows a sole 18 with an inlay 1 indicated by dashed lines, which extends only over the forefoot region and is provided throughout with transverse profiling 2. In figure 11, the longitudinal section along line S-T of the sole in figure 10 shows only the outsole of sole 18, whereas the plastic material in which inlay 1 is foam-embedded and which is firmly connected with the outsole, has been omitted for presentational reasons.

Figures 12 and 13 show in diagrammatic manner how an inlay 1 is

preferably integrated into the overall structure of a sole, i.e. between outsole 19, on the one hand, and the interior sole 20 as well as orthopaedic sock 21, on the other hand, whereby heel component 22 may, with a flat sole 18 as shown in figure 12, be a wedge insert.

Both inlay 1 of sole 18 according to figure 12 and the sole according to figure 13 are provided with continuous transverse profiling in the forefoot region and in the heel region, whereas in the waist region longitudinal profiling 8 is provided. With the heeled shoe according to figure 13, this longitudinal profiling is designed in the form of a rising arch, as shown at 23, and it passes via a steep downward wedge 24 of inlay 1 at the start of the heel into transverse profiling 2 of the heel region.

With the sole according to figure 12 spikes 12 are pushed through corresponding through-holes of inlay 1 into transverse profiling 2 of the forefoot region and the heel region, the base parts 25 thereof, which are laterally supported against the vertical flanks of transverse profiling 2, being, for instance, welded to inlay 1 or attached in some other manner to said inlay. To make the soles provided with an inlay according to the invention use may be made of any conventional material, whereby other conventional inlays, such as the heel wedge with the wedged shoe according to figure 12 can be foam-embedded into the sole, together with inlay 1.

Lastly, figure 14 shows a partial cross-section of an inlay according to the invention, which consists of a composite sheet material consisting of several layers 26, 27 and 28, which are combined by bonding so as to form an integral composite material:

The lowest layer 28 in figure 14 consists of adjacent square box profiles 29 arranged at a very small distance U of, for instance, 0.1 mm or less from one another or even closely next to one another. These box profiles

29 are firmly connected, by means of layer 27 which consists of adhesive, with layer 26 consisting of a resiliently flexible, flat sheet material.

The special advantage of inlay 1 according to figure 14 consists in the fact that the inlay can bend only in the direction of arrow X in an upward direction but not in the opposite direction, since in the latter case the side parts 30 of adjacent box profiles 29 support themselves against one another. A shoe, the sole of which is provided with such an inlay, is, for instance, particularly suitable as a football shoe, since this inlay prevents undesirable downward bending of the sole when kicking a ball, e.g. when shooting at the goal.

The sheet material forming layer 26 may consist, for instance of spring steel or Teflon and have a thickness V, depending on the type of material, between preferably 0.1 mm and 2 mm, whereas the box profiles 29, which may, for instance, be extrusions of a high-strength aluminium alloy, may have a side length W in the range of preferably 3 mm to 5 mm. If required, box profiles 29 or any other profiles provided in such a composite sheet material, may, if they consist of metal, be provided with a soft plastic coating which largely attenuates the noises caused as the profiles knock against one another.

Figures 15, 16 and 17 show much enlarged partial longitudinal sections, not necessarily to scale, of three embodiments of an insole 31 comprising an inlay 1 with transverse profiling 2 and a filler composition 33 (shown in hatching) filling up the profiling cavities and/or intermediate spaces 32. This filler composition 33 fills up the profiling cavities and/or intermediate spaces 32 in such a way that the upper surface 34 and the lower surface 35 of the insole are level.

The inlay 1 and the filler composition 33 are preferably connected with each other in firmly adhesive manner to give a component, e.g. by bonding and vulcanising, when consisting of metal the inlay being preferably provided with a primary coat for improving adhesion. The filler composition may be or contain plastic and/or felt and/or other filler material.

While in figure 15 the thickness of the insole 31 equals the height H of the inlay 1, in the insole 31 according to figure 16 the thickness R of the filler composition 33 is greater than the height H of the inlay 1, so that on both sides of the insole thin layers Y and Z of filler composition cover the inlay 1. Layer Y may also only be provided on one side, preferably on the side facing the foot, in particular to improve the comfort for the foot.

In the embodiment according to figure 17 the comfort for the foot is even much improved by bonding or loosely applying a thin inlaid sole 36 to the upper side 34 of the composite article formed of the inlay 1 and the filler composition 33.

The inlay 1 shown in figure 15 having cross-sectionally rounded trapezoidal transverse profiling 2 may be for example the inlay shown in figure 1. In this figure the inlay consists for example of spring steel sheet having a primary coating and a material thickness of preferably 0.2 mm and a profile period P of 5 mm and a height H of 2.0 mm and is levelled on both sides by a filler composition made of soft elastic plastic.

The inlay 1 shown in figure 16 having groove-like transverse profiling may be for example the inlay shown in figure 2. The inlay 1 shown in figure 17 having zig-zag-like transverse profiling may be for example the inlay shown in figure 3 but preferably without the spike holes 10 and without the plane regions 13 of figure 3. Basically the insole 31 may be made of any inlay according to the invention, whereby in the case of the inlays according to figures 8 and 9 the recesses 16 may also be filled with the filler composition 33 which may also have shock-absorbing properties.

It is self-evident that the filler composition has a hardness considerably reduced as compared to that of the inlay material, e.g. is soft elastic and possibly also shock-absorbing, so that the properties of the inlay according to the invention are highly effective in spite of the filler composition. The same also applies to the plastic material by which an inlay according to the invention can be surrounded by moulding.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. Inlay for a shoe, in particular for a sport shoe, extending at least in the forefoot region, and preferably over the entire area, of the sole, c h a r a c t e r i s e d in that the inlay possesses, at least in the forefoot region in the transverse direction of the sole, and in particular in the given roll-off region of the sole, high stiffness against bending, whereas vertically in the longitudinal direction of the sole its stiffness against bending is low.

2. Inlay according to claim 1, c h a r a c t e r i s e d in that the inlay extends over substantially the entire length of the sole and is capable of torsional deformation in the longitudinal direction of the sole from the heel to the large toe.

3. Inlay according to claim 1 or 2, c h a r a c t e r i s e d in that the inlay is elastically resilient.

4. Inlay according to claim 1, 2 or 3, c h a r a c t e r i s e d in that vertically to the plane of the sole it is stiff against point pressure.

5. Inlay according to one of claims 1 to 4, c h a r a c t e r i s e d in that the inlay, which is made preferably in one piece, consists of hard, resilient sheet material and has, at least in the forefoot region, and preferably throughout substantially the entire sole area, a transverse profiling provided transversely, and preferably at right angles to the longitudinal direction of the sole, said profiling extending preferably over the entire width of the inlay.

6. Inlay according to claim 5, c h a r a c t e r i s e d in

the inlay is provided, in the region of the waist and/or in the region of the heel, with longitudinal profiling extending in the longitudinal direction of the sole.

7. Inlay according to claim 5 or 6, characterised in that the hard, resilient sheet material is metal and/or plastic sheet material, preferably steel sheet, and more especially spring steel sheet.

8. Inlay according to claim 5, 6 or 7, characterised in that the hard, resilient sheet material has a thickness between 0.1 mm and 1.5 mm, and preferably between 0.3 and 0.5 mm.

9. Inlay according to one of claims 5 to 8, characterised in that the transverse and/or longitudinal profiling has a grooved, fluted, ribbed, channelled, undulating, furrowed or bead-type and preferably corrugation-like, trapezoidal, zig-zag-shaped or corrugation-like cross-section.

10. Inlay according to one of claims 5 to 9, characterised in that the width of the periodically repeating cross-sectional profile elements amounts to 5 mm to 20 mm, preferably 6 mm to 16 mm, and by way of special preference 8 mm to 13 mm.

11. Inlay according to one of claims 5 to 10, characterised in that the transverse and/or longitudinal profiling is, in the profiling direction, undulating, serrated, fluted, grooved or furrowed or exhibits some other secondary profiling at right angles to the profiling direction.

12. Inlay according to one of claims 1 to 11, characterised in that the inlay extends over substantially the entire width and/or over substantially the entire length of the forefoot region.

13. Inlay according to one of claims 1 to 12, characterised in that the inlay extends over substantially the entire area of the sole.

14. Inlay according to one of claims 1 to 13, characterised in that the inlay has, in a predetermined region of the foot or in several predetermined regions of the foot a recess facing the ground, with a view to better transmission of the foot pressure to the ground, preferably in the regions of the large toe, the ball of the foot and/or the heel.

15. Inlay according to one of claims 1 to 14, characterised in that knobs or spikes are attached in non-detachable manner to the inlay, or can be replaceably attached with the aid of fastening means provided on or within the inlay.

16. Inlay according to claim 15, characterised in that the base parts of the knobs or spikes or the fastening means are secured in recesses in the inlay and support themselves against the side walls of the recesses, in that preferably they match the adjacent side walls of the recesses in positive manner, and/or in that they are firmly attached to said side walls.

17. Inlay according to claim 16, characterised in that the recesses into which the base parts of the knobs or spikes or the threaded inserts are inserted, are recesses in the transverse and/or longitudinal profiling.

18. Inlay according to one of claims 1 to 17, characterised in that the inlay is provided with through-holes for plastic materials, which are distributed over the surface of the inlay, preferably with one or several injection ducts through which the plastic material is injected, and with a plurality of smaller through-holes.

19. Inlay according to one of claims 1 to 18, c h a r a c - t e r i z e d in that the inlay consists of a composite sheet material having several layers combined with one another so as to form an integrated composite structure, at least one of which possesses transverse profiling, at least in the region of the forefoot.

20. Inlay according to claim 19, c h a r a c t e r i s e d in that the composite sheet material comprises a flat layer of flexible, resilient material and a profile layer.

21. Inlay according to one of claims 1 to 20, c h a r a c - t e r i s e d in that the inlay is developed as an insole by filling the profiling cavities and intermediate spaces, respectively, with filler material in such a way that the upper and/or lower surfaces of the inlay provided with the filler material is plane.

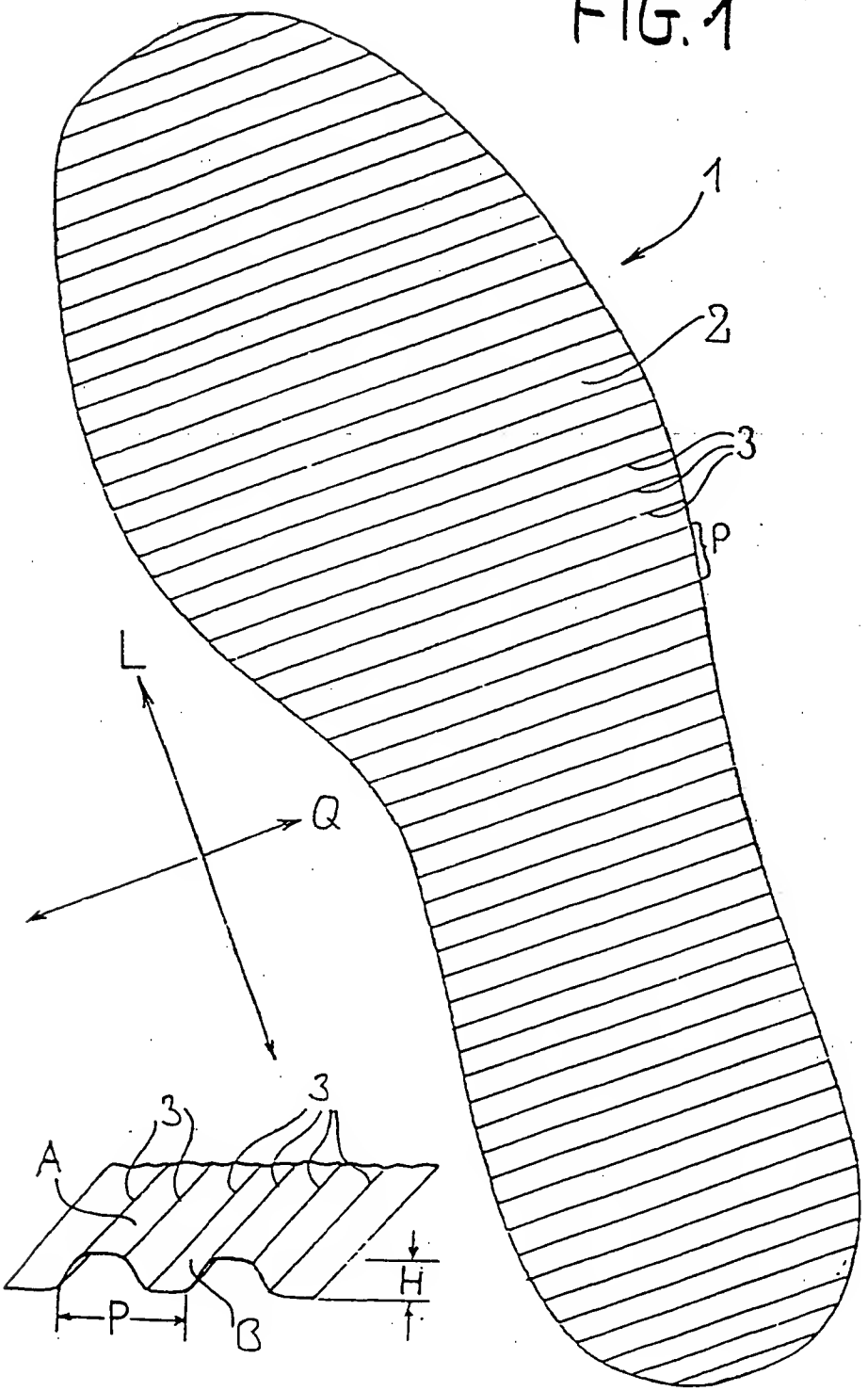
22. Sole for a shoe, c h a r a c t e r i s e d in that the sole has an inlay according to one of claims 1 to 20, which is firmly connected with the sole or forms part of the sole or that the sole is an insole according to claim 21 or is firmly connected with such an insole.

23. Sole according to claim 22, c h a r a c t e r i s e d in that a plastic material is foamed, injected, cast or moulded in any other way around the inlay or it is vulcanised into a plastic material which forms at least part of the sole or the filler composition or the entire filler composition.

24. Shoe, c h a r a c t e r i s e d in that the shoe has an insole according to claim 21 or a sole according to claim 22 or 23.

25. Sport shoe, c h a r a c t e r i s e d in that the sport shoe comprises a shoe according to claim 22 or is a shoe according to claim 22.

FIG.1



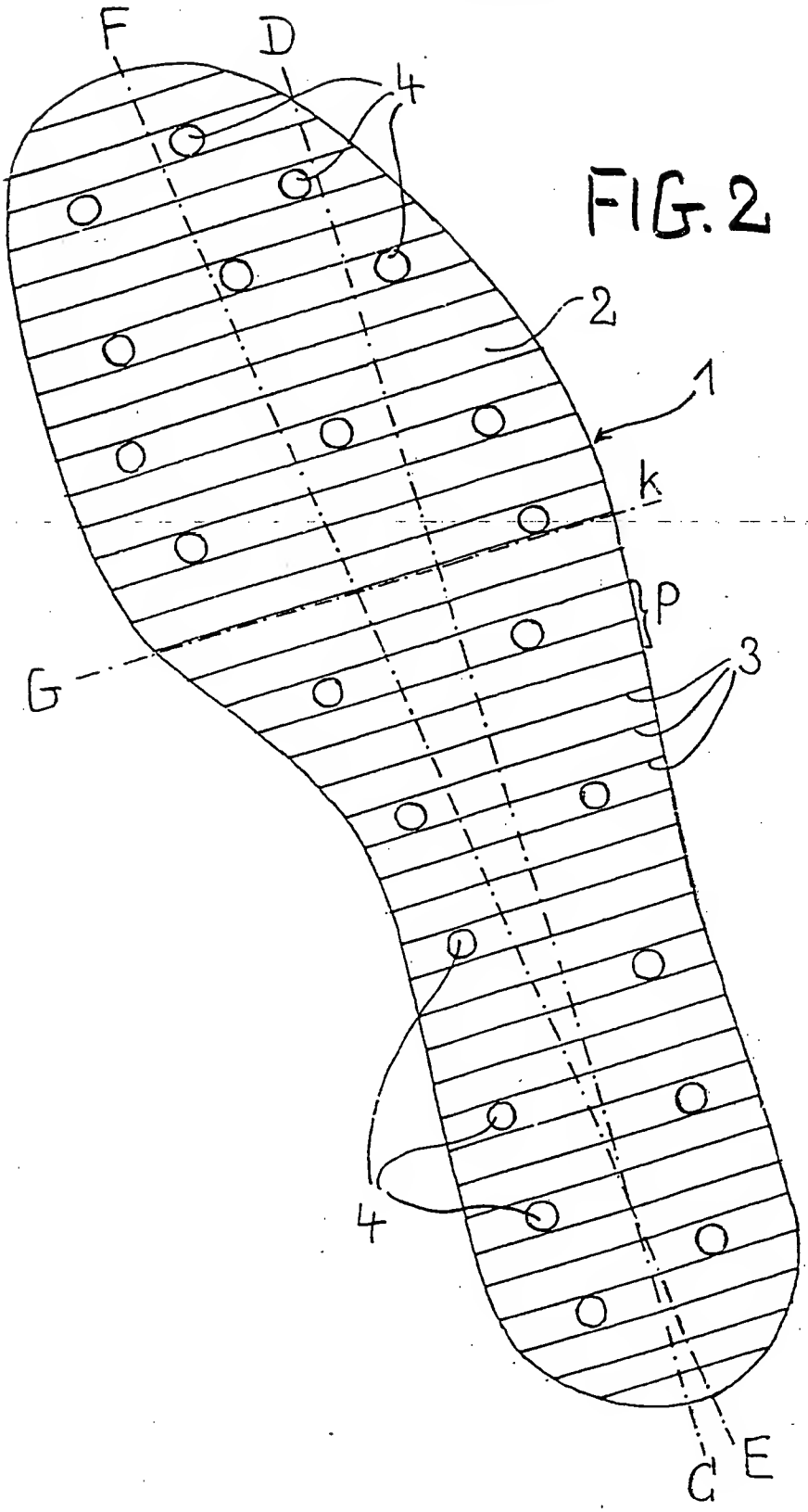


FIG. 2

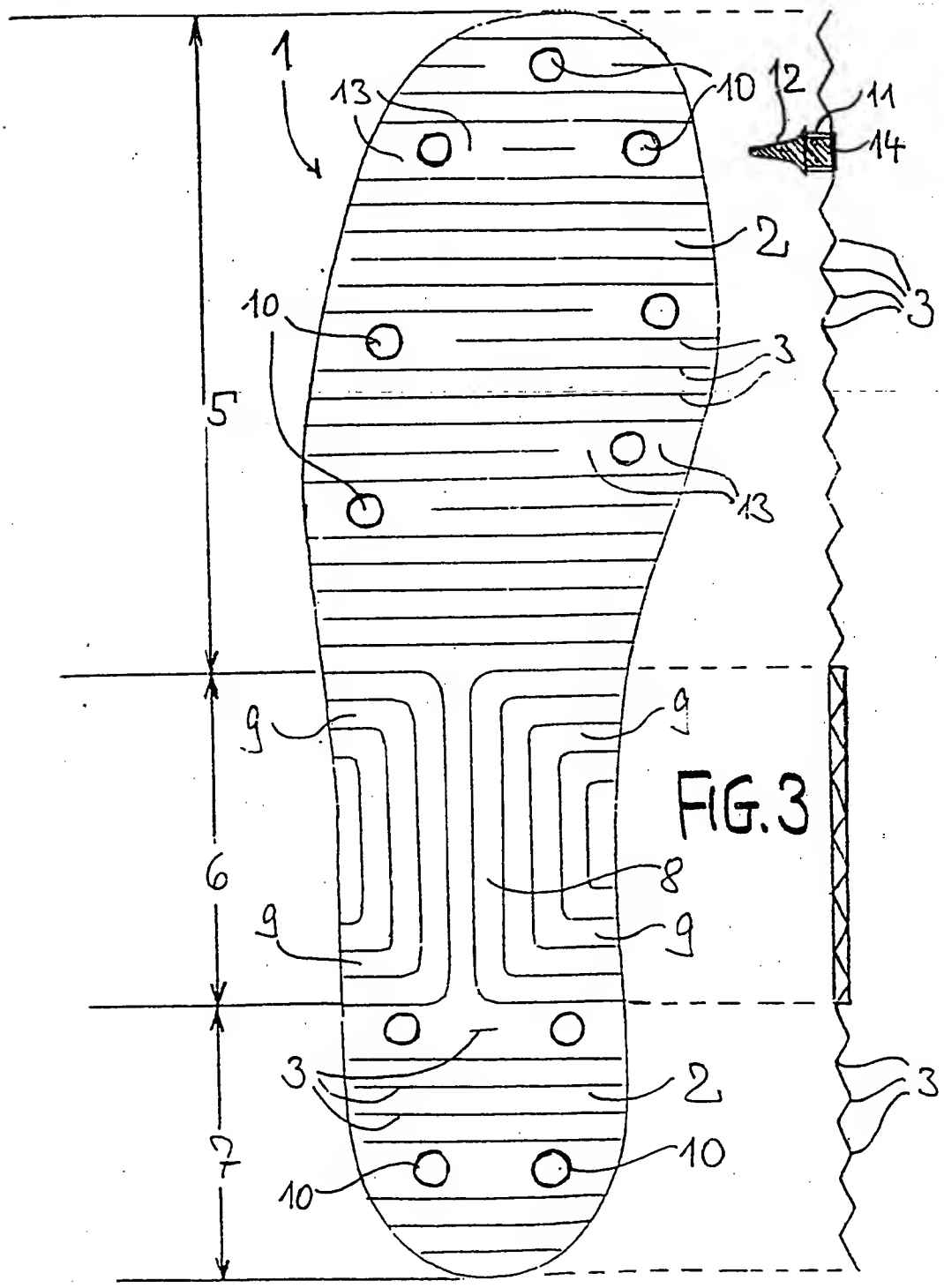


FIG.3

FIG. 4

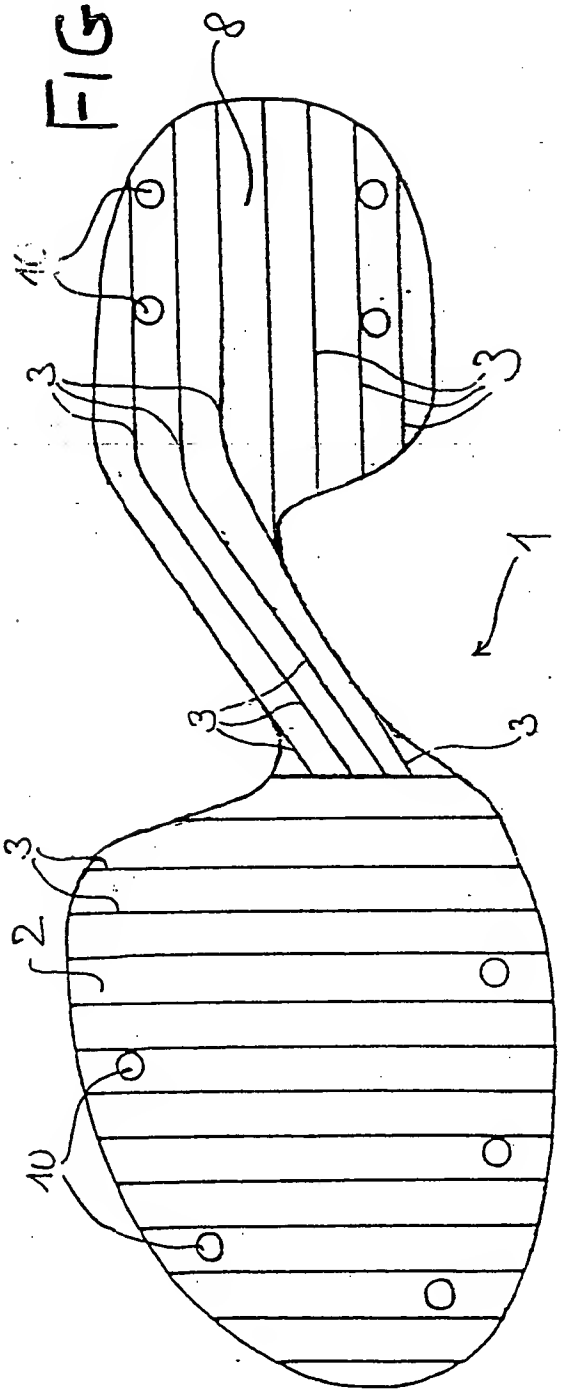


FIG. 5

FIG. 6

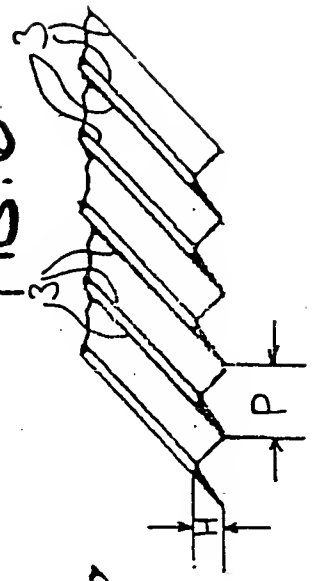


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FIG. 8

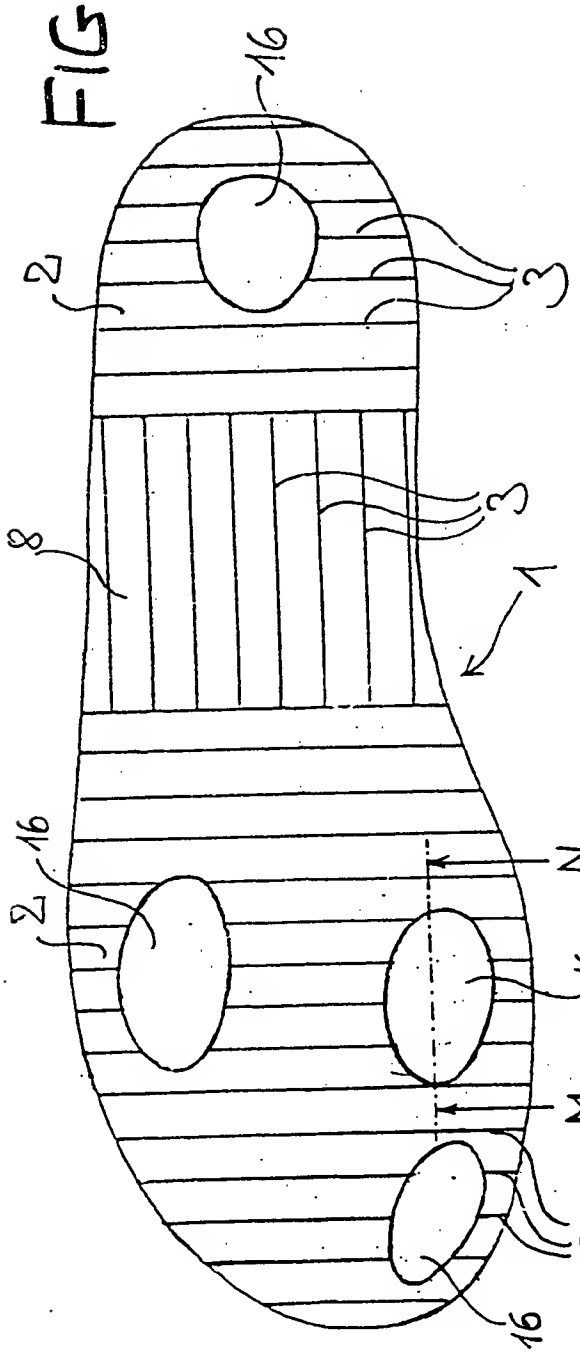


FIG. 9

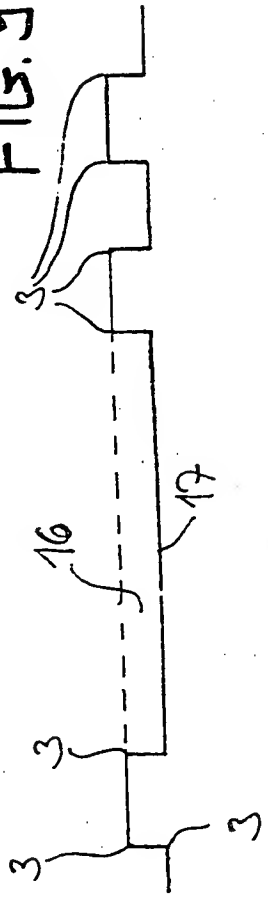


FIG. 10

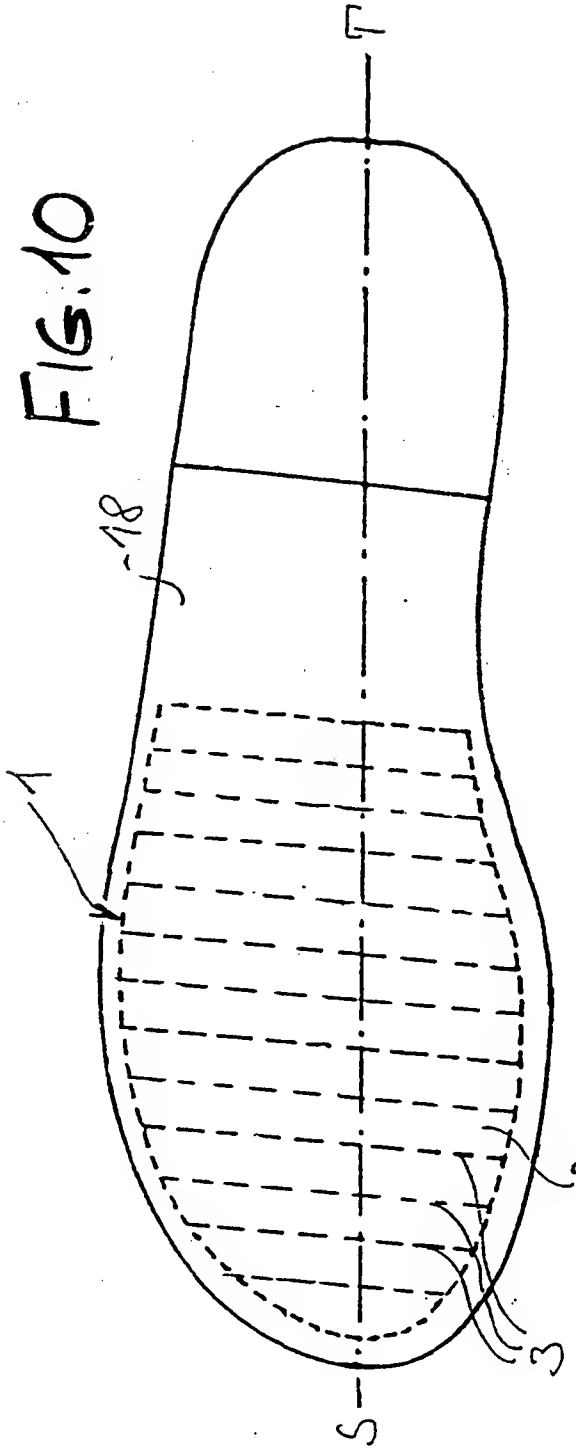
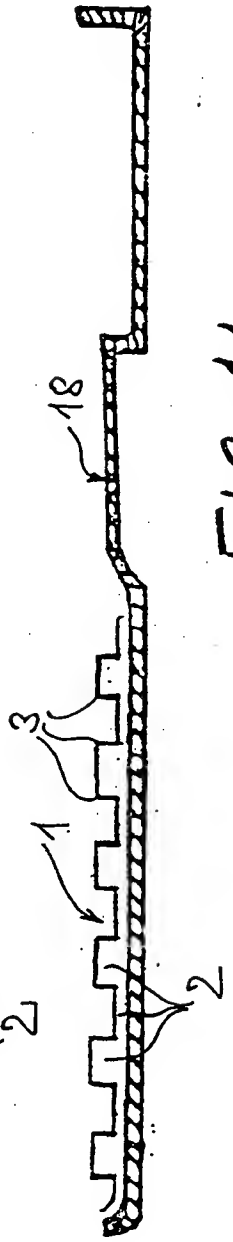


FIG. 11



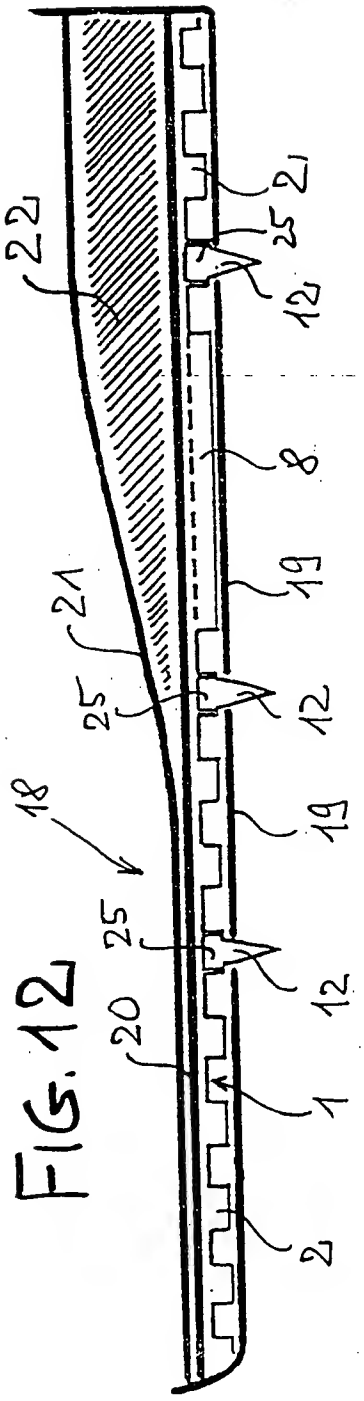


FIG. 12

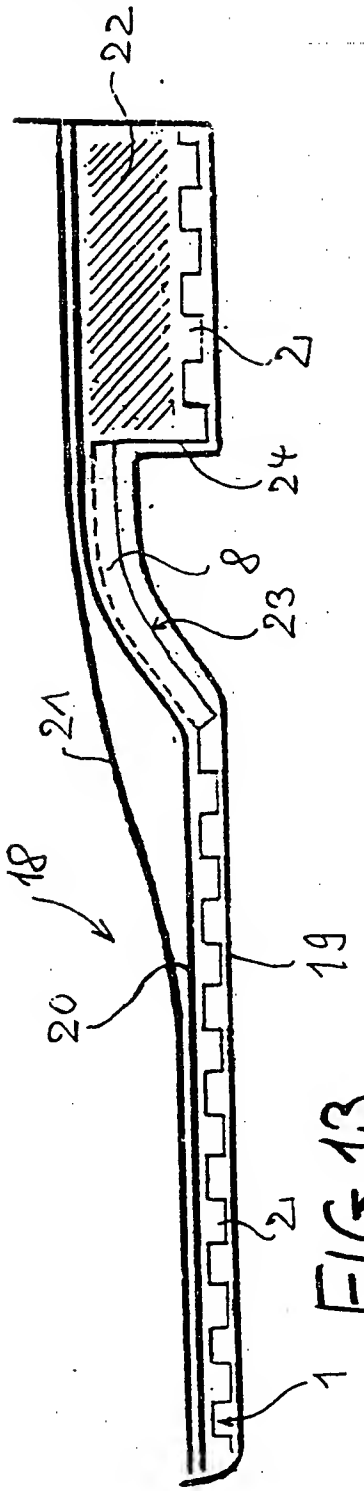


FIG. 13

FIG. 14

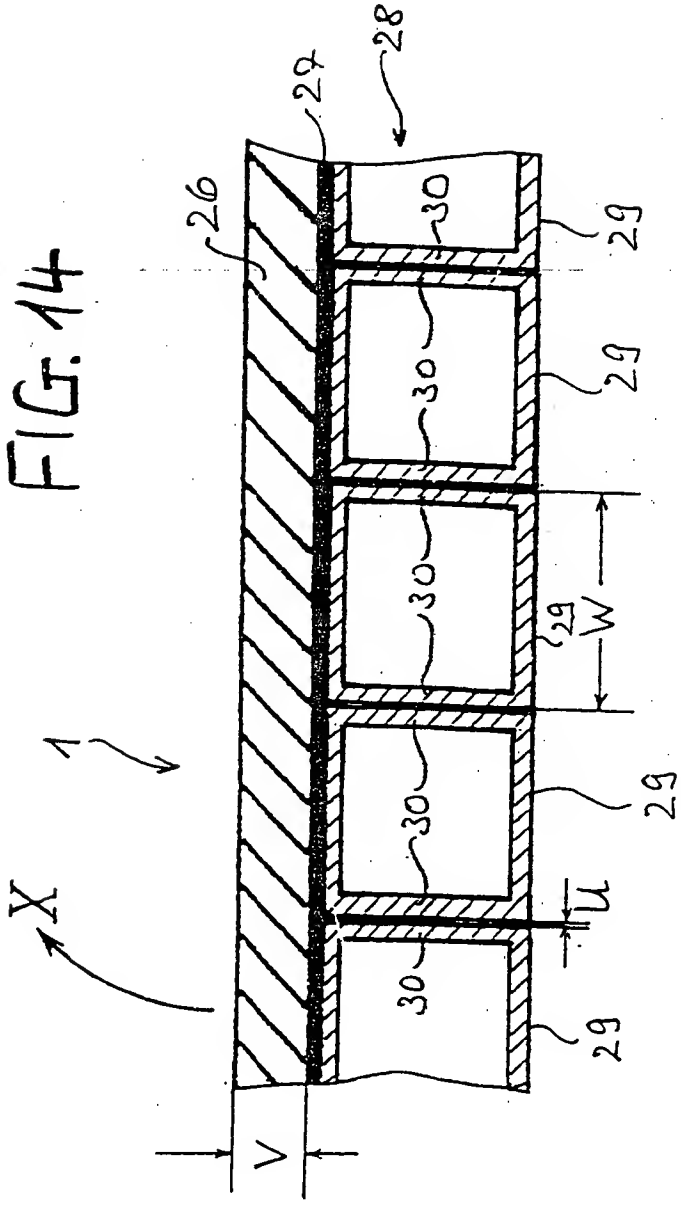


FIG.15

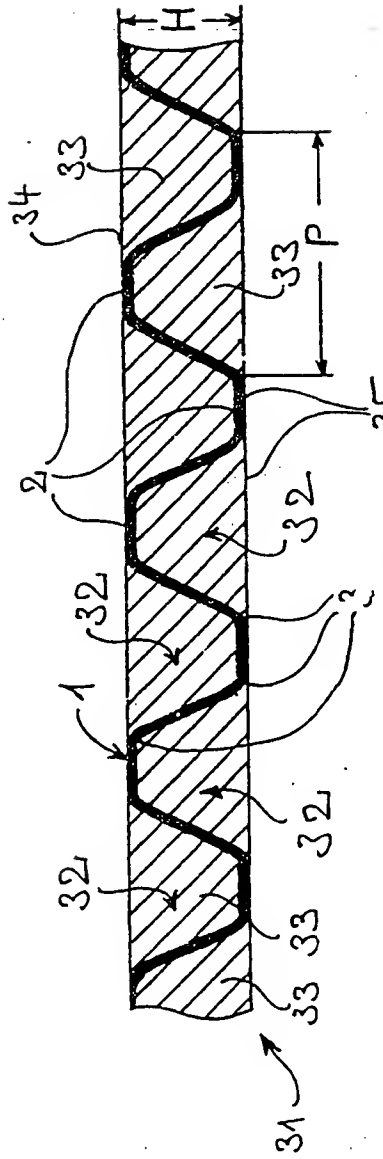


FIG.16

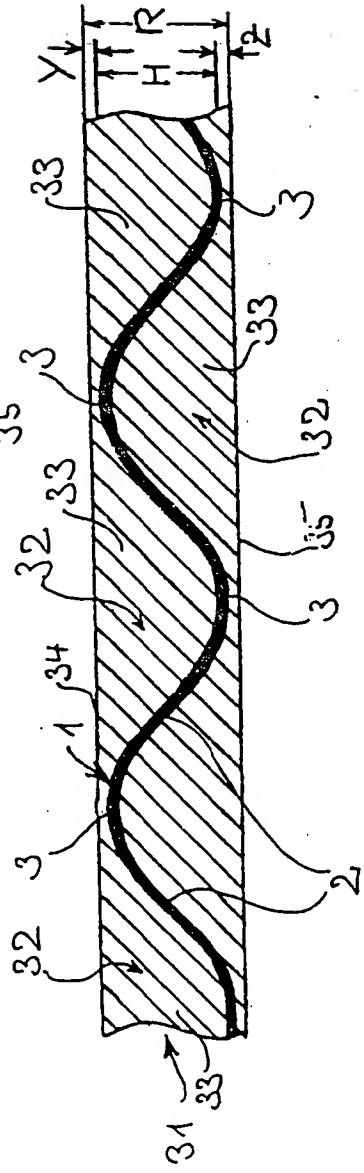
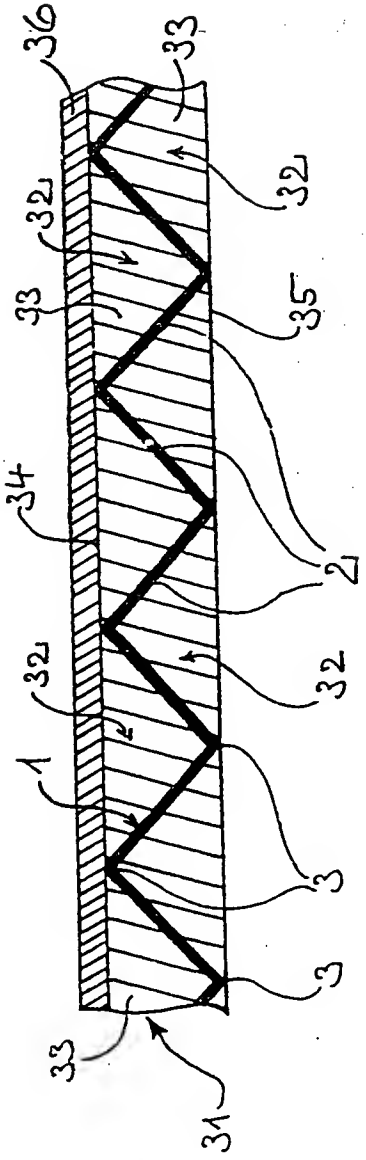


FIG.17



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